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EXPLORING ECOLOGICAL CITIZENSHIP THROUGH THE 'LENS' OF ENERGY CONSERVATION PRACTICES: A CASE STUDY OF THE UNIVERSITY OF KWAZULU-NATAL RESIDENCE STUDENTS

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ABSTRACT

Energy is a critical aspect of contemporary society, almost everything that is used by people in households, workplaces and at schools requires energy to keep functioning. However, inefficient energy usage has negative impacts on the environment. The current energy and environmental crisis have been attributed to the over consumption of energy. As a result, there is a widely growing recognition that energy conservation practices can play a critical role in addressing the prevailing energy crisis. Conservation practices are influenced and supported by pro-environmental attitudes and behaviour. It is on this note that this study sought to explore the energy conservation knowledge, attitudes and behavior of students residing in the on-campus residences at the University of KwaZulu-Natal (UKZN). The study employed the mixed methods approach where the questionnaires were used to quantify students' practices and the in-depth interviews explored their attitudes towards energy consumption. Students were randomly selected to complete the energy-questionnaires but purposive sampling was used to select key knowledgeable participants who had resided in the University residences for more than four years. The study was framed around Ecological Citizenship theory which examines the role that ordinary citizens can play in the mitigation of environmental issues. The literature and case studies reviewed, showed that 'green campus' initiatives within universities are playing an important but often overlooked role in reducing the carbon footprint. Nevertheless, data gathered from the study portrayed a negative and discourteous attitude towards energy usage by UKZN students. The study also revealed that students were willing to conserve energy if their efforts were rewarded with incentives, particularly a reduction in their residential fees. University fees play a crucial role in shaping students' attitudes and behaviour such that most students felt that they were entitled to use electricity anyhow because they would had paid for it. Therefore, the study saw the need for the university to introduce environmental education so that students look beyond the monetary benefits associated with saving energy. The study noted that it is important for the university to provide energy-feedbacks to the students so that they become aware of the difference they can make when they conserve energy within the university.

Keywords: energy conservation; green campus initiatives; environment; attitudes; behaviour; students; ecological citizenship; environmental education.

PREFACE

The research described in this dissertation was carried out in the School of Built Environment and Development Studies at the University of KwaZulu-Natal, Durban from January 2015 until December 2016 under the supervision of Mrs. Catherine Sutherland.

This dissertation represents original work by the author and has not otherwise been submitted in any form for any degree or diploma to any tertiary institution. Where use has been made of the work of others it is duly acknowledged in the text.

_____	_____
Takunda J Mathathu	Mrs. Catherine Sutherland

DECLARATION

I, Takunda Joseph Mathathu declare that:

1. The research reported in this thesis, except where otherwise indicated, is my original research.

2. This thesis has not been submitted for any degree or examination at any other university.

3. This thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.

4. This thesis does not contain other persons' writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:
   a. Their words have been re-written but the general information attributed to them has been referenced
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Signed: ……

Date…….....

ACKNOWLEDGEMENT

"Balizibusiso ngama gamazo/ Count your blessings" –Johnson Oatman, Jr 1897.

I want to take this opportunity to acknowledge and thank the Almighty God for his mercy and compassion towards me, and for opening opportunities when things seemed financially impossible. On the same note, I want to express my gratitude to my Pastor Hama Blessing Chesa and the saints at Eastlea Tabernacle in Harare – *Mwari akuropafadzei*/ God bless you all.

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To my beloved father Brother Elias Mathathu and mother Valerie Mathathu for your sacrifice, perseverance and unwavering support.

Acronyms and Abbreviations

AEEP……Accelerated Energy Efficiency Plan

CFLS…….Compact Fluorescent Lights

DSRA……...Department of Student Residence Affairs

DUT…….Durban University of Technology

EC……..Ecological Citizenship

EMP……..Energy Management Programme

GCI…….Green Campus Initiative

GHG…….Greenhouse Gases

HVAC…….Heating Ventilation and Air Conditioning

IDP……..Integrated Development Plan

MCPP……...Municipal Climate Protection Program

MDGs…….Millennium Development Goals

NEETF……Natural Environmental Education and Training Foundation

PCP……Power Conservation Programme

RAs……Residents Assistants

SDGs……...Sustainable Development Goals

UCT……...University of Cape Town

UJ……..….University of Johannesburg

UKZN…….University of KwaZulu-Natal

UNIDO……..United Nations Industrial Development Organization

TABLE OF CONTENTS

"Today's wastage is tomorrow shortage"

Virti Shah

Chapter One: Introductory chapter

1.1 Introduction

> *"Energy has become an important aspect of human life such that things like internet, mobile phones, laptops, cooling system, lighting system in fact nearly everything in our life need electricity to functioning. Energy has been recognised as an indispensable resource for the promotion of economic activities and the enhancement of human welfare. However, inefficient use of energy results into energy crisis and negatively impacts the environment" (Seniwoliba and Yakubu, 2015:64).*

Environmental issues in the recent years have emerged to be a major global concern due to the intensifying and disquieting rate of environmental degradation. As a result, many governments and organizations across the globe have to date devised and/or implemented initiatives aimed at minimising some necessarily human-induced environmental problems. For instance, in the year 2000, the United Nations included environmental sustainability as one of its Millennium Development Goals (MDGs), a move underscoring the importance of addressing environmental issues in the global development agenda. MDGs laid the foundation for the Sustainable Development Goals (SDGs), which places the issues of environmental sustainability at the core for any future development initiative. SDGs will be influential in the establishment of low carbon communities, given the strong focus on energy and sustainable cities in the SDGs. A landmark measure that seeking to conserve the natural environment, prior to the formulation of the MDGs was the 1997 Kyoto Protocol Treaty which compelled developed states to reduce their carbon emission. Whilst the effectiveness and the impact of these developments and initiatives remain debatable, there is however need to recognise the willingness and efforts of the actors in these different global agendas to address environmental degradation. Thus, at the 'macro-level' a significant number of pro-environmental initiatives have been developed and implemented, and there has been a notable rise in 'green-movements' and 'green-states' campaigns in an effort to raise awareness around environmental issues.

More recently, issues pertaining to the environment are have increasingly become part of major political debates and global summitry. For example, there has been a series of United Nations Framework Convention on Climate Change (UNFCCC) annually dubbed the Conference of Parties

(COP) summits. The 21st COP was held in Paris in 2015 where the Paris Agreement on Mitigation and Adaptation was reached, and COP22, which focused on the importance of cities in addressing climate change was held in Morrocco in 2016. Despite efforts of this magnitude, some environmentalists such as Schmidt (2010) criticize these conferences and argue that the resolutions to cut greenhouse gas emissions are failing to materialize due to the politics of climate change. This largely refers to the general reluctance of the heavily-industrialized 'super-power' nations to support and endorse the conferences' resolutions. For instance, at the COP15 held in Copenhagen in 2009, there was no binding agreement reached to curb the emissions of gases because most of the developed countries were reluctant to adopt these initiatives (Schmidt, 2010).

In support, Boyd (2009) highlights that the United States of America (USA) does not commit to the Kyoto Protocol because it never ratified the treaty despite being a major emitter of carbon dioxide. The politics of climate change also came into play during the Delhi Declaration Conference when an American delegate remarked, "the USA will not agree to impractical targets to reduce greenhouse gases" (Kalipada and Saleemul, 2002:404). Presently the election of Donald Trump as the new President of the USA raises further concerns to this effect given his currently denialist approach to the climate change agenda (Milman, 2016). Hence, the politics of climate change has over the years undermined the realization of the Millennium Development Goal of ensuring environmental sustainability. This prompted Winkler (2005:355) to argue that "there is a large gap between what is required to address climate change and the current commitments that have been negotiated in the international arena".

In the midst of the environmental discourse on the state's role in combating environmental issues, there has been widely accepted recognition that environmental responsibility can no longer be confined at the 'macro-level' of governance. Rather the care of the environment now demands ordinary citizens' commitment towards assuming pro-environmental behaviour in an effort to preserve the natural environment (Dobson, 2003). Accordingly, Brand (2007) argues that environmental sustainability depends on the willingness of individuals in society to assimilate pro-environmental attitudes and behaviours in order to curb ecological depletion. For Dewaters and Powers (2011:1699) the sustainable environmental path "can no longer be determined by professionals and politicians but by every citizen in society". It is to this effect that environmental governance now advocates for the integration of citizenry efforts in alleviating the escalating

environmental challenges and problems. The ecological consequences confronting the contemporary society in relation to energy include climate change, depletion of the ozone layer, pollution and scarcity of energy resources leading to an apparent energy crisis. Essentially, the environmental crisis mainly features the high energy consumption in communities translating to a large carbon footprint (Zhang et al, 2013). Yet energy is critical to determining the limits of economic development of a country and affects the overall lifestyle of people (Jiang et al, 2013), hence the contemporary analogy that 'we live in a carbon economy'. As a result, the current energy consumption rates have aggravated the environmental crisis due to the high carbon dioxide emissions induced by the use of energy (Lo et al, 2012).

It is important to underscore that energy conservation practices are now widely recognised as the most crucial means of addressing environmental problems and reducing carbon dioxide emissions. This stance was supported by Mwakasonda (2007) who acknowledges that the industrial sector was the chief contributor to carbon dioxide emissions in South Africa. Hence a reduction in energy consumption in that sector would also reduce the carbon dioxide/ monoxide emissions. The linkage that exists between society's energy consumption patterns and the environmental crisis has led to the call for the establishment of low carbon societies. Low carbon societies refer to those societies that are cautious about how their daily activities and lifestyles impact on the environment through energy consumption, even at the household level. Low carbon societies support the green economy and the concept of 'going-green' through numerous initiatives that includes conserving energy, improving transport, saving water and promoting localized products to reduce the carbon-foot print.

1.2 Problem statement

The current energy crisis is critical in Africa, as most countries are incapable of financing alternative energy sources to address the on-going energy crisis (Mokwena, 2009). Ironically, countries in Sub-Saharan Africa are worst affected by climate change due a high level of climate vulnerability. South Africa, a high-income country in the African continent, is equally affected and 2007 marked the climax of the crisis when energy demand outstripped supply resulting in massive energy deficit. The state responded by introducing mandatory electricity rationing in the form of load-shedding schedules in an effort to control the energy crisis (Tyler, 2010). However, an analysis of the load-shedding initiative show that the load-shedding schedule tends to protect

some sectors deemed vital to the country's economic growth such as industries. Public institutions such as hospitals and educational institutions, are not frequently affected by the load-shedding compared to residential areas. In South Africa, "load-shedding is mainly scheduled for the institutional buildings and households because they consume significant amount of energy" (Maistry, 2014:1). Rickerts et al (2007) also highlight that about two-thirds of electrical energy is consumed within buildings, particularly households. As a result, the South African government's energy reduction targets have also been extended to the universities such that they too are requested to cut-down their energy consumption by 20 percent by the year 2020 (DME, 2009).

Given this background of low energy security in South Africa, this research focused on the issue of energy consumption at University of KwaZulu-Natal (UKZN), with a particular emphasis on university residences. Students form the crop of leadership of the future, have access to technology and use electricity in their various learning and social spaces while studying and residing at university. Hence, universities are regarded as high energy consumers. Peterson et al (2007) argue that university buildings are responsible for vast consumption of energy due to the large academic community they support. Universities also have a considerable impact on the natural environment due to large spaces they occupy and the various activities they embark on such as construction. Inefficient usage of energy within universities buildings will not only have a negative impact on the environment but it will also result in high utility costs for management.

UKZN spends about R100 million annually to pay for its electricity bills, revealing the massive scale of energy consumption at UKZN (Knox, 2013). As a result, these increased electricity costs compelled the university management to explore measures of reducing energy consumption through raising awareness and fostering behavioural change particularly amongst the students (Knox, 2013). In spite of the looming energy crisis and rising university utility costs, most students appear to be reluctant to change their behaviour to minimize the over-consumption of electricity. This is further worsened by the weak monitoring system of energy usage within the premises of the university. Therefore, the over-consumption of energy in a university setting is partly driven by student negligence and apathy which tends to be propelled by the lack of environmental education and weak energy-use monitoring. The load-shedding schedules commissioned by the national government is merely a short-term measure aimed at mitigating the energy crisis but sustainable energy conservation practices can play a crucial role in addressing the contemporary

energy crisis. This then calls for the university community to integrate energy conservation practices in their daily activities in order to reduce energy consumption within university establishments. This study therefore seeks to assess the attitudes and practices of students towards energy consumption at UKZN using the 'ecological citizenship' approach. There is a glaring deficiency of literature analysing student practices or attitudes towards energy consumption, in fact the rare literature is documented on household settings. Accordingly, Kagawa (2007:320) highlights that "existing literature discusses what students should know regarding ecological sustainability but there is scarcity of publications that explores what students actually know and do as far as the environmental crisis is concerned". Kahler (2003:230) perceives universities "to be microcosms where people live, study and work and their impact on the global climate are significant". For instance, in 23 public universities the energy consumption in South Africa is almost similar to commercial energy usage given the large number of student users in residences within these universities. Consequently, there is a growing realization that universities have the ability to play a significant role in reducing greenhouse gas emissions in their host communities. A high energy consumption rate in a university setting will have a double-effect in that apart from escalating the energy crisis, it will also increase the university's utility costs. Hence, many universities have embarked on 'green-campus' initiatives that are aimed at reducing the utility costs and lessening environmental challenges.

For Starik et al (2002), the academic community has a long standing history designing robust environmental projects, successful in cutting-down the carbon-footprint, but ironically universities per se have not in themselves implemented such practices. It is against this background that this study seeks to examine students' awareness of the current energy crisis and to determine the impact of the crisis on their study routines. It is mportant to note that, the findings would not only provide valuable insight to the department of residence affairs in their efforts to promote a 'conservation-culture' amongst students but useful in covering the 'knowledge-gap' in the scholarship of energy conservation.

1.3 Research objectives

1.3.1 The main purpose of the study

The aim of the study is to explore the energy conservation knowledge, attitude and practices of students residing in the on-campus accommodation at the UKZN using ecological citizenship as a theoretical frame.

1.3.2 The objectives of the study:

1. To explain students' awareness of the current energy crisis and their environmental knowledge.
2. To assess students' adherence to the energy use regulations implemented in the university residences halls.
3. To describe and document students' practices towards energy consumption in relation to the notion of their 'carbon footprint'.
4. To analyse students' attitudes and behaviours towards energy consumption in relation to global ecological citizenship literature.
5. To provide recommendations to the residence officials pertaining students' practices and attitudes towards energy use within the university residences.

1.3.3 Research questions:

1. What are some of the general environmental issues that students are aware of?
2. How is electrical energy utilized in the university residences?
3. What are some of the practices exhibited by students that tend to escalate energy usage?
4. What are some of the initiatives implemented in the residences that are aimed at curbing over-consumption of energy?

5. To what extent do students adhere to the university's regulations/rules on energy usage within the residential halls?

6. What are the potential benefits of conserving energy in the university residences?

7. In what ways does the current energy crisis / and load-shedding affects students in residences?

8. How influential is environmental education in raising environmental consciousness amongst students towards the mitigation of the energy crisis?

1.4 Rationale for the study

This study investigates the attitudes, practices and behaviour of students towards energy consumption because it is clear that students' actions are a major component in any 'green-campus' initiative. It is vitally important to understand students' attitudes and their perceptions on energy usage in order to identify knowledge-gaps, myths and beliefs that can hamper the success of 'green-campus' initiatives. More importantly, 'green-campus' initiatives have a 'spill-over' effect in that when students graduate they will be able to transfer environmental and sustainability notions beyond campus life. In support, Singh (2010) states that ecological awareness on campuses has strong potential of educating future professionals who may take informed decisions on behalf of communities at some stage. Hence, universities can be instrumental in equipping graduates with environmental knowledge and values moulding them to be better ecological citizens. As Amaral and Martins (2015:156) argue:

> *"Universities play a key role in the quest to sustainable development and they have a special social responsibility on society's development, particularly on the proliferation of public awareness pertaining environmental issues".*

In addition, an investigation of students' energy consumption patterns is important because it enables the university management to identify measures that can be utilised to conserve energy. Energy conservation initiatives are a current necessity in South Africa because financial savings from these initiatives would relieve the already out-stretched universities' operational budgets.

Such financial savings could also be a crucial component in the on-going debates around the issue of free education and university fees increase.

1.5 Theoretical framings: ecological citizenship and energy consumption

This study examines literature focusing on the relationship between environmental problems and the role that ordinary citizens can play in the mitigation of environmental issues. Hence, the study is framed around Ecological Citizenship theory (EC). The root term ecology is often used interchangeably with the natural environment and means a system that contains all the living organisms. Citizenship on the other hand comprises of a set of juridical, economic, political and cultural practices or obligations defining an individual as a competent member within society (Turner, 1990). Applying the notion of citizenship to ecology implies that people living within the broader community recognise their environmental responsibility and obligation to conserve natural resources. For Jagers (2009), ecological citizenship outlines an individual' inter-personal relationship that encompasses social justice and compassion for environment issues. The main concept of EC developed by Dobson (2003) provide the theoretical framework for this and these ideas are explored in more depth in Chapter 2 (literature review). In this study, EC theory was used as framework in exploring and analysing the attitudes and behaviour of students towards energy usage.

The study discusses literature detailing government efforts to reduce environmental degradation and illustrates how the former efforts are often undermined by the private sector which is pre-occupied with profit-generations even at the natural environment's expense. The study discusses the commodification of the environment that has resulted in the 'metabolism-rift' where nature is exploited for economic purposes. It is on this basis that EC calls for low carbon communities where individuals and civil societies take bold steps in conserving the environment and energy. Cleverland and Morris (2006) cited in Seniwoliba and Yakubu (2015:66) define energy conservation "as a collective term for activities that reduce end-use demand for energy by reducing the service demand". Thus, energy conservation involves efforts, action and practices undertaken by individuals to reduce their energy consumption be it at work, school or home. The notion behind the energy conservation concept is the shifting of individuals' attitudes and behaviour so that they use energy sustainably in a way that reduces the carbon footprint.

From discussing environmental issues broadly on a community level, the study narrows the focus to the academic community. It explores the important role students can play in reducing energy consumption, despite the fact that UKZN students are often not regarded as high energy consumers because a majority of them proceed from energy deprived backgrounds or households (Bond, 2014). Nevertheless, it is still important to consider students' roles in curbing energy consumption as the literature demonstrates how each individual's energy usage pattern matters. Furthermore, the literature reviewed in Chapter 2 highlights the importance of energy literacy within a university setting. Energy literacy and environmental education are connected because both terms offer a learning platform for individuals within society to have a full understanding of environmental issues, so that they can act in a pro-environmental manner. DeWaters and Powers (2011:1700) define energy literacy as "a process that equips individuals with through understanding of the impact that energy production and consumption have on the natural environment". Energy literacy can be regarded as a crucial skill conscientising ordinary people on how their daily energy consumption pattern can negatively affect the environment. As a result, energy literate individuals will always be willing to embrace energy conservation initiatives in an effort to reduce their carbon footprint.

1.6 Location of the Study

The study was conducted at the University of KwaZulu-Natal, Howard College (UKZN) which is located in Durban. Primary data for the study was obtained from in-depth interviews with residential officials and surveys administered to the registered students residing in the on-campus residences at Howard College in 2015 recruited for this study.

1.7 Brief overall of the research methodology

The study uses both quantitative and qualitative research methods. This mixed methods approached enables one to delve into students' behaviours, practices and attitudes towards energy consumption within the university residences by using both qualitative and quantitative methods of data elicitation. The mixed methods approach is suitable for this study because it offers a holistic insight into the various factors shaping students' perceptions regarding electrical energy usage. In-depth interviews were undertaken to gain an understanding of students' perceptions, behaviours and opinions towards energy consumption. Purposive sampling was used to identify key interviewees as illustrated in the methodology chapter. Data obtained from the interviews was

transcribed and imputed into NVIVO for coding and analysis. As highlighted, the study uses a quantitative approach whereby students are randomly selected to complete a questionnaire with relevant questions on energy consumption. The energy-questionnaire consists of open-ended and closed-ended questions seeking to examine and quantify the students' practices towards energy utilization in the residence. Data elicited from the questionnaires administered to students was entered into a Microsoft Excel spreadsheet and later on imported to Statistical Package for Social Scientist version 11.0 (SPSS) for analysis. Lastly, a comprehensive account of students' energy consumption patterns was constructed through the triangulation of data gathered from the in-depth interviews and the energy-questionnaires.

1.8 Structure of the dissertation

Chapter 1 is an introductory chapter that provides a brief background to the research problem, the main objectives of this paper, research questions, definition of the key concepts and rationale of the study. Chapter 2 (literature-review) presents the theoretical concepts drawn from the literature including scholarly articles, books and various other sources relevant to the theory of ecological citizenship. Furthermore, Chapter 2 integrates literature advocating for low-carbon citizens, for instance how ordinary people can be motivated to become ecological citizens. In addition, the chapter also explores the concepts of the carbon footprint and energy consumption, and the impacts of over-consumption of energy within cities and public institutions. Lastly, the chapter provides a description, summary, and a critical evaluation of some of the energy studies conducted within public institutions, particularly universities. Chapter 3 outlines the contextual background of the study area. The chapter explores electrical management by the eThekwini municipality and UKZN. A descriptive overview of the industrial sector and its impact on the environment and electricity grid are also provided. Chapter 3 considers the macro and micro approaches employed by the eThekwini Municipality that are aimed at reducing energy consumption. An analysis of the UKZN environmental policy is also provided in Chapter 3. Lastly, chapter 3 considers the concept of 'sustainable future leadership' at UKZN and offers an insight in the UKZN Energy Management Program (EMP).

Chapter 4 provides a detailed overview of the mixed methodology approach and describes the instruments employed for data collection. Moreover, the chapter details the interview process including describing the design and the distribution of energy-questionnaires to students. The

chapter outlines the sampling, limitations and the data analysis procedures employed in the study. Chapter 5 is the presentation and discussion of the data collected empirical, the latter involves comparing and contrasting findings from this study with other secondary sources of data. Chapter 6 gives a comprehensive summary of the research findings, and presents the conclusion to the entire study. It also provides some recommendations based on the main findings of this study.

Chapter Two: Theoretical Framework and Literature review

2.1 Introduction

This chapter first outlines the concept of 'ecological citizenship' which has emerged from the broader behavioural approach that seeks to persuade an individual to modify his/her behaviour to be more environmentally or carbon friendly. Ecological citizenship is employed as a framework for analyzing the relationship between environmental issues and the role that ordinary citizens play in the mitigation of the ecological crisis. The chapter also explores the strength of the 'ecological citizenship' framework and articulates its importance to this research. Thereafter, the chapter provides a review of literature on contemporary environmental issues and the looming global energy crisis. A literature review is important because it provides the framing background for developing the research question and it also establishes the context of the topic (Justus, 2009). Insight from other research enables one to discover important variables that are relevant to one's study or topic (Hart, 1998). The theoretical framework defines and explores the concepts that are used to analyse the energy consumption patterns and practices of UKZN students. Finally, the chapter reflects on a range of case studies that reveal different communities' responses to environmental issues and the challenges they face in the mitigation of the contemporary energy crisis.

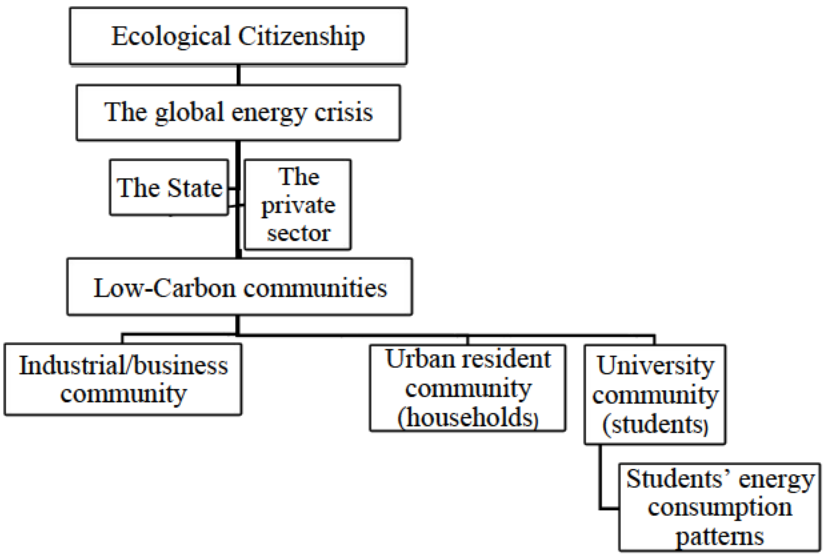

Figure 2.1: Graphical representation of the literature reviewed

As illustrated in Figure 2.1 above, the literature review chapter explores the role played by the state, the private sector and different communities in addressing the escalating energy crisis. Case studies conducted in various parts of the world are used as reference points in this debate.

2.2 Environmental responsibility

Ecological citizenship (EC) theory is presented as a new concept that calls for societies to value and conserve their natural environment. EC is conceived as a 'green theory' that fosters a sense of environmental responsibility within individuals for them to become moral agents of environmental sustainability. EC is becoming prominent in contemporary times due to the escalating environmental crisis. Dobson (2003) notes that individuals have the ability to minimise environmental problems if they are to conduct themselves in a pro-environmental manner. Dobson (2003) may have been the first person to coin the word 'ecological citizenship' but the practice of conserving the natural environment has always been evident within ancient African communities. Africans have always possessed good environmental ethics that were passed from one generation to another mostly through oral tradition. Such environmental ethics were embedded within the African philosophy of Ubuntu (Mawere, 2012).

Ramose (1999) cited in Mawere (2012) defines Ubuntu as a philosophy of oneness that brings a sense of solidarity between people and their environment. Thus, the spirit of Ubuntu was influential in preserving the environment and people sought the permission of traditional leadership before engaging in any activity that may disturb the ecological ecosystem (Mawere, 2012). For Fairhead and Leach (1995:1028), "Ubuntu is a broadly positive relationship between people and their natural environment". From this assertion, it is clear that the people and the environmental were interdependent of each other and they co-existed in harmony. Hence, the indigenous communities were already accustomed to the fundamental principles of EC of taking care of their environment because they were very much aware that their lives depended on the environment.

The principles of EC were already enshrined in local communities before Dobson (2003) developed his theory. Local communities' livelihoods were hinged on the environment because all their daily needs that include food, medicine, shelter, clothes, water and many others were drawn from 'mother- nature' (Mawere, 2012). However, this relationship between humans and the environment was greatly altered in South Africa by the two-legged forces of apartheid and

capitalism, which commodified the environment. Gibbs (2010) argues that the onset of colonialism facilitated the Eurocentric ideologies that viewed nature as a resource that could be exploited by humans. Consequently, the pursuit of raw materials and profits led to an increase in the depletion of the natural environment over time. Apart from environmental degradation, Karl Marx contended that capitalism created a 'metabolism-rift' between the people and the environment (Clark and York, 2005). Thus, nature was regarded as a source of capital and the spirit of Ubuntu was eroded-away as a result. The commodification of the environment characterises contemporary society that no longer embraces the spirit of Ubuntu. Therefore, the restoration of the natural environment can only be achieved through the rejuvenation of Ubuntu or the application of EC. One is then justified to contend that EC is simply an extension of Ubuntu and its guiding principles are not new to the African context. Nevertheless, EC could be instrumental in reviving the spirit of Ubuntu, which is centred on reducing environmental depletion by encouraging people to 'go-green'.

2.2.1 Ecological Citizenship

EC is a theory that explores the intersection between citizenship and the environment (Dobson, 2003). This linkage is clearly outlined by Jagers (2009) who regards EC as an inter-personal relationship hinged on social justice, responsibility and compassion for environmental issues. Dobson (2003) developed EC theory on the fundamentals of the 1987 Brundtland report's notion of sustainability, which calls for the current generation to use the available resources in a manner that will not foreclose the ability of future generations to pursue and fulfil their needs. Therefore, the recognition of a citizen's environmental responsibility is a central tenet of EC as opposed to the general notion of citizenship rights. A relational understanding of EC however, enables one to think about how ecological citizenship is produced and enacted within local communities.

Current debates around EC have focused on the need for individuals to develop 'green attitudes' thereby influencing their behaviours to become ecological citizens (Scott et al, 2012). EC as emphasized in Dobson (2003) is a normative green political theory rooted within a theory of change, which essentially advocates for sustainable lifestyles and livelihoods. EC is an important theoretical framing for the analysis of the attitude and behaviour of individuals towards environmental issues and its ultimate aim is to produce an environmentally responsible citizen. Accordingly, EC argues that the progress towards sustainable development is now directly related to the willingness of an individual to take responsibility for caring for his/her environment. EC

places ordinary citizens at the core of any environmental initiative, arguing that care of the environment can no longer be left to governments (Brand, 2007).

2.2.2 Outlining EC's main tenets

2.2.3 Citizenship

Citizenship is regarded as a concept encompassing individuals' privileges, rights and duties as a member of a civil society or a state. Thus, the concept is associated with personal obligations and relates to civil and political rights. Wolf et al (2009:504) define citizenship as "a status or practice of individuals arising from membership to a polity circumstances which confer a set of reciprocal rights and responsibilities on members". Whereas, for Turner (1992) citizenship comprises a set of practices, cultural, economic, juridical and political that defines an individual as a competent member of any given society.

Dobson (2003) argues that EC extends beyond the remits of liberal and civic citizenship. EC is characterized by "actions individuals undertake not only as voters but importantly also as consumers or members of local communities" (Wolf et al, 2009:518). According to Jagers (2009) EC differs significantly from traditional citizenship because it is not exclusively a public matter but it "incorporates the private sphere into the political realm" (Jagers, 2009:20). In defending his theory, Dobson (2006) distinguished between citizenship as status and citizenship as a practice, whereby he argued that EC is about practice rather than just a status. Thus, individuals assume an active role that is guided by obligations and duties to be performed in an effort to lessen the environmental and energy crisis.

2.2.4 The EC behavioural perspective

EC focuses on influencing and motivating individual behaviour so that regular individuals can develop 'green attitudes'. Attitudes are defined by Eagly and Chaiken (1993) cited in Lo et al (2012) as an individual's overall feeling towards a phenomenon or situation. The feeling can be negative or positive, however an inquiry into an individual's attitude consequently outlines his or her behaviour. Thus, there is a strong connection between one's behaviour and attitudes such that if one opposes a pro-environmental attitude he/she will be more willing to be sensible towards environmental issues. For Scott et al (2012) EC aims to modify an individual's behaviour so that he/she can become more responsible for his/her environmental impacts. EC is then a framework

on how people should behave in relation to climate change and the energy crisis. According to Latta (2007), EC aims to inculcate citizens with a moral attitude and responsibility that will motivate them to preserve the natural environment around them. Hence, EC aims to raise environmental awareness amongst ordinary citizens so that they can voluntarily reduce their carbon-footprint in their daily activities. Environmental awareness or education is paramount to EC because it enables individuals to make informed decisions. Ideally, the more people are knowledgeable about environmental issues the more likely they are to embrace pro-environmental behaviour. From this assertion it is much clearer that EC theory targets an individual's perceptions, practices, preferences and abilities so that the individual can be motivated to be environmentally conscious.

2.2.5 Criticism of EC

Wolf et al (2009:507) criticise EC as "a normative theory that takes the conceptualisation of citizenship in novel and unconventional directions such that its application becomes contested". Thus, EC is criticized for ignoring the process of socialism that confines individuals to act within the expected social, economic, cultural and institutional contexts, and this shapes individuals' daily actions. For instance, attitudes themselves are influenced by a variety of social and cultural factors, which can undermine environmental education. In their study, Owens and Driffill (2008) state that studies have highlighted that individual behaviour is highly influenced by other factors that includes costs and socio-cultural ties. One is then justified to contend that environmental awareness initiatives are likely to be ineffective if they run counter to other powerful influences like prices and socio-cultural norms. As a result, EC has been criticized for being too individualistic rather it ought to be a collective approach by groups of people in communities (ASSAf, 2011).

This view has been contested by Meerah et al (2010) in their study which showed how the principles of EC instilled within students at both primary and secondary school levels influenced the immediate local community to be sensitive towards environmental issues. It is also important to highlight that most of the mitigation strategies for environmental degradation over the years have to a greater extent overlooked the role of the individual. Instead, environmental mitigation strategies have mostly been applied at the macro-level through civil society movements, governments' departments and other agencies. EC challenges this approach by focusing primarily

on the individual's responsibility and ability to embrace pro-environmental behaviour whilst influencing others in the process. Ultimately, EC argues that people will "benefit immensely by choosing and embracing sustainable behaviours at home, on the roads, in the office and at schools" (Ribbink, 2012:110).

2.2.6 Importance of EC to the study

The Ecological Citizenship approach is of vitally important to this study because it clearly illustrates the linkage between citizenry and environmental issues. As outlined above, EC theory targets an individual's perceptions, practices, preferences and abilities so that he or she becomes motivated to be environmentally conscious. These tenets of EC formed the framework of the study as the study focuses on students' perceptions and attitudes towards the individual energy consumption in the university residences. Thus, by employing EC in this study it is possible to document and analyse students' attitudes and their behaviours towards energy consumption in relation to global ecological citizenship literature. Through the 'lens' of EC it is possible to measure levels of awareness towards environmental issues and further to determine how 'ecological citizens' are produced within a university setting.

2.3 Constructing a low carbon society

2.3.1 An imminent global energy crisis

The massive scale of environmental degradation globally, primarily due to human activities has given rise to advocacy for and lobbying of environmentally-friendly approaches in an effort to mitigate or reduce environmental degradation. The high utilisation or consumption of energy within contemporary society has been highlighted as one of the main causes of environmental degradation. This energy crisis is well illustrated by the rise in energy imports amongst countries and also the introduction of load-shedding schedules particularly in the Sub-Saharan region. The energy crisis climaxed to warrant the introduction of alternative energy sources such as wind-energy and solar energy. Nevertheless, it is evident that these alternative energy sources will take time to implement especially in developing countries, hence propelling the continued reliance on carbon dependent energy in many countries. Studies have also highlighted that fossil fuel use remains the main contributor to human induced carbon dioxide emissions (Lo et al, 2012). Therefore, human activities have led to the contemporary energy crisis and environmental

degradation. Africa for instance is faced with many environmental issues ranging from deforestation, water pollution and climate change amongst many others.

Given the contemporary environmental and energy crisis, it has become obvious that energy conservation is one of the most crucial ways that humans can address this crisis. However, energy conservation as a practice is highly influenced by environmental attitudes, environmental education or environmental knowledge. For Farmer et al (2007:33) environmental education is defined as a process aimed at enhancing an awareness of issues affecting the environment by individuals. In particular, it seeks to promote pro-environmental values through motivating citizens to act individually or collectively in preserving the environment. It is therefore important to highlight that this process actually places emphasis on the ability of citizens to enact or to spearhead initiatives that are aimed at conserving the natural environment and energy. This belief in citizens, that calls for individuals within society to take 'small' but bold steps to address environmental issues, particularly when it comes to saving electrical energy is gaining traction. This was also emphasized by the South African President at the introduction of the presidency energy conservation campaign. During the campaign, President Jacob Zuma stated that

> *"While the government will play its role in curbing the energy crisis, every single individual must also contribute to the energy saving program. Simple things will make a big difference, we are talking about simple efforts such as switching off the lights and plugs when leaving your office and even at your home."* (*Times Live*, 13 March 2015).

This current belief bestowed upon citizens in mitigating the environmental and energy crisis is actually a reflection of the failure of the state and the private sector to lessen environmental degradation. Over the years the state and the private sector were highly regarded as the most crucial players in mitigating environmental degradation due to their strong influence they exert on the citizens (Scott et al, 2012). However, the intensification of the debate on best practices to curb the environmental and energy crisis effectively criticize the role of the state and the private sector in this regard. As a result, authors such as Scott et al (2012), Brand (2007), Zhang et al (2013) and Lang (2015) concluded that the failure of the state and the private sector to address the escalating environmental crisis has expedited the rise of 'low-carbon communities'. It is however important

to first consider the role that both the state and the private sector have played in advancing the 'low-carbon community' concept.

2.3.2 The state, private sector and the looming energy crisis

2.3.2.1 A brief overview

As highlighted above, the state has always been regarded a major 'player' in the mitigation of environmental and energy crisis. Most countries, globally including South Africa follow a necessarily liberal and democratic model, limiting the political pressure they can exert on citizens to reduce their energy consumption. Nevertheless, the state has the ability to formulate different policies aimed at encouraging citizens to conserve energy. The limitation of such aspect of such policies is the lack of political will to enforce them. Taking an extreme position, Ophuls and Boyan (1992) cited in Jagers (2009) advocate for the replacement of liberal and democratic reasoning when it comes to environmental issues. Thus for them, there is need to presume eco-authoritarian approach if the state is to cope with an impending contemporary ecological disaster (Jager, 2009:19). This line of thought is however not feasible within the context of human rights and the liberal approach that characterises most states across the globe. In spite of this, it is useful to consider how the South African government has tried to subdue the country's energy crisis.

2.3.2.2 The South African Government Approach to Energy Crisis

The year 2007 arguably proved to be the climax of the energy crisis in South Africa as the whole country was plunged into total darkness highlighting the looming energy crisis. According to Tyler (2010:580), the "energy crisis resulted in immediate mandatory electricity rationing for the country's large power users". The state however took a further step of transforming the mandatory rationing of electricity usage into a target under the Power Conservation Programme (PCP) (Tyler, 2010). Thus, from late 2007 onwards the nation started to implement a number of measures to curb the energy crisis that the country was experiencing. In spite of the state's efforts, it is concerning that the state was reactive instead of being pro-active in addressing the energy crisis. It is also a pity that this reactive approach to both the environmental and energy issues characterises the 'business as usual' interventions that are employed by the state and the private sector. For example, prior to the 2007 'power-blackout', the 1998 White Paper had already articulated the importance of establishing an institutional capacity to enable energy efficiency targets to be met (Tyler, 2010). Now, in spite of the 1998 White Paper's proposition regarding the utilisation of energy, it is

disappointing to note that neither institutional development nor mandatory energy efficiency implementation occurred for the next decade (Tyler, 2010). Similarly, Scott et al (2012:200) note that despite the fact that South Africa has one of the highest levels of emissions per capita in the world, the country does not have any binding target to reduce greenhouse gas emissions. This then questions the genuine political willingness of the state to invest in measures that are aimed at mitigating the energy crisis within the country.

For Foster (2014:320), "to be warned of an impending energy crisis a decade in advance and not do anything about it seems all but suicidal". Hence, Foster (2014) contends that the power supply crisis that was experienced in 2007 could have been avoided if the state had been firm in initiating the proposed measures to conserve energy. Thus, there was no mandatory measure implemented by the state to the country's large power users over the years, only "a voluntary initiative dubbed the Energy Efficiency Accord existed between the private sector and the Department of the Environment" (Tyler 2010:581). Now, given the nature of the private sector that is profit-oriented, it is not surprising that the voluntary initiative never had an impact as far as reducing the energy consumption in South Africa is concerned. In reality, energy consumption levels actually escalated resulting in the 'energy-blackout' in 2007 as illustrated earlier on. It is notable from this brief outline that the state may have good interventions on paper to curb the energy crisis but in practice these interventions are overlooked. For instance, the state has over the years drafted policies aimed at conserving the environment but currently South Africa is not even near to the status of a low-carbon economy because of its heavy reliance on coal (Tyler, 2010).

2.3.2.3 The Private Sector

On the other hand, the private sector has contributed immensely to the current energy crisis within the country. This argument is well illustrated by Nevin (2015:102) who notes that heavy industry particularly the smelters and refineries of South African's minerals are no longer a viable option within the context of energy conservation. The argument projected here is that these heavy industries are exerting a lot of pressure on the electricity national grid such that energy consumption tends to overtake the grid's capacity. More so, it is important to highlight that the citizens themselves as energy consumers are also contributing to this disparity between energy demand and energy supply. As a result, the state has introduced load-shedding whereby "great swathes of residential, commercial and industrial areas are now being excluded from the grid for

a number of hours to ease the demand pressure on the national grid" (Nevin, 2015:103). The state has also embarked on a project that seek to construct two more power stations namely the Medupi and Kusile stations but these projects has received a lot of criticism because they are both long overdue in production and hugely over budgeted as well (Klein and Weavind, 2015:19).

2.3.2.4 Responses to the looming Energy crisis

In response to this electricity crisis, Eskom on the other hand implemented the "Accelerated Energy Efficiency Plan (AEEP) that was aimed at reducing electricity demand by 3, 000 MW by 2012 and further 5, 000 MW by 2025" (Tyler, 2010:581). However, the irony of this response is that Eskom particularly generates its revenues from electricity sales and like other private industries the core interest is generating profits. This then makes one wonder whether the private sector can really spearhead genuine energy conservation initiatives considering that their production process and profits are hinged on the utilisation of massive electrical energy. In support of this assertion Dryzek (1992) cited in Jagers (2009:19) contends that the energy crisis issue is unfortunately rooted in the short-sighted and profit-driven regime of production consistent with contemporary developmental pathways. Similarly, Tyler (2010:584) argues that "the current private sector remains oriented towards the accumulation of profits in spite of the looming energy crisis. And this is largely so because there is no clear or strong government strategy to combat over consumption of energy". Most pro-environmental researchers have placed ordinary citizens at the centre of any initiative that seek to reduce the energy and environmental depletion, given that they are unable to make significant shifts at the level of the state and large private corporations. Notably, this explains why enormous responsibility has now been bestowed upon ordinary individuals to combat energy crisis through fostering and encouraging pro-environmental citizenship behaviour and/or attitude.

2.4 Low-Carbon Communities

Many studies conducted within the field of ecological and environmental research have shown that the state's efforts to reduce energy consumption have failed to yield the desired results (Brand, 2007; Fawkes, 2005; Foster, 2014; Heiskanen et al, 2010; Jager, 2009). As a result, the focus has been placed on individuals and local communities to come up with initiatives and approaches that are aimed at cutting down energy consumption even within their households. This was well highlighted by Swyngedouw (2005) cited in Scott et al (2012:201) who clearly states that "there

has been a shift of responsibility from the state to its local communities to reduce greenhouse gas emissions". Likewise, Brand (2007:624) stated that the "ultimate environmental responsibility in a neo-liberal society has been shifted onto the shoulders of the individual citizen". Currently, there is a notable growing interest from researchers and policy-makers to stimulate and accelerate pro-environmental activities within communities.

A community in this study refers to a group of interacting individuals who share the same environment, values and resources (Jiang et al, 2013). Low-carbon communities are basically those communities that are very much aware of environmental issues and they therefore strive to reduce their own impacts on the environment. In some cases these communities tend to 'go green' by recycling products, buying local produce, conserving energy, relying more on public transport, cycling and even walking. From this brief definition it is clear that public attitudes and behaviour is very important in the implementation of low-carbon communities (Zhang et al, 2013). For Jackson (2005) citizens' behaviour is crucial to the impact that the community will have on the environment, hence pro-environmental attitudes or behaviour is the foundation to nurture and strengthen a low-carbon community. A low carbon community can only become a reality if people are willing to commit themselves and conduct their daily activities in an environmentally friendly manner. In support, Jiang et al (2013:612) points out that "individuals' engagement to reduce their carbon emission have significant impacts on the overall low-carbon sustainability in a community".

Nevertheless, low-carbon communities' establishment relies on the level of awareness of environmental issues and low-carbon practices by community members. This point was well articulated by Zhang et al (2013) arguing that the major hindrance to low-carbon communities in most Chinese communities is the lack of environmental education. In their study, almost half of the sample (46.5%) had heard about the 'low-carbon' concept but did not know any details apart from that and they could not link the concept of 'low-carbon' to their daily activities (Zhang et al, 2013). Likewise, Moloney et al (2010:7615) concludes that "transitioning to low carbon communities requires an understanding of the community practices and resultant emissions including technologies, infrastructures and institutions associated with and accessed by the communities". At the core of these findings is the willingness of the government particularly the local government to support the transition of the current communities to low-carbon communities.

2.4.1 Government's role in building low carbon communities

Low-carbon communities are of great significance not only to South Africa but to the world at large in addressing the contemporary energy crisis. Therefore, it is important for the government to facilitate and support initiatives that seek to instigate the expansion of low-carbon community projects (Zhang et al, 2013:135). The argument here is that it is not enough to just assume that people within communities can sustain their on-going projects in the absence of governmental policies, regulations, funding models and other forms of support. Thus, governments should endeavour to create an enabling environment whereby community efforts to curb the escalating energy crisis are provoked and encouraged. The role played by the government was best described in a study conducted in the United Kingdom (UK). In their study, Petersen et al (2010) illustrate with empirical evidence how the local authority body in Islington managed to engage with its communities in encouraging them to embrace the notions of low-carbon communities. To this effect, there has been a greater emphasis by the UK government to support the growth of low-carbon communities. This is well highlighted by a number of policies that have been implemented in the UK over the past decade including *Meeting the Energy Challenge* and the 2009 White Paper: *UK Low-Carbon Transition Plan* (Petersen et al, 2010:7597).

It is important to note that the South African government has over the years conveyed its willingness to address the issues around the energy crisis and more than that to also incorporate community efforts in this regard. For instance, the 1998 Energy White Paper gives prominence to improving the national energy governance and addressing energy-related environmental problems (Mwakasonda, 2007:11). At the crux of the South African government efforts to curb energy-related issues is now the recognition of community action as an essential process in the mitigation of the current energy crisis. Nevertheless, this recognition must not be used by the government to shift its responsibilities to local communities, as its support is needed to sustain grass-root initiatives. Moloney et al (2010:7622), in the same vein suggest that "the government ought to implement institutional and infrastructural systems that support community based organisations' efforts in combating climate change". Accordingly, Scott et al (2012), Jiang et al (2013) and Brand (2007) have urged the government to take a leading role in spearheading and providing strategies that can incentivise the local communities to adopt pro-environmental behaviours.

2.4.2 Government's challenges in sustaining low carbon communities

The major challenge for the South African government as far as the transition to low-carbon society is concerned is grappling with the reality and need for economic growth that comes at expense of the natural environment. In most cases, the government finds itself in a compromising position between the much needed pro-environmental approaches and the much sought-after economic gains. Now, in practice the latter tends to take prominence and this then undermines the credibility of the government in sustaining the low-carbon community initiative. Thus, by virtue of having an energy intensive economy that is highly dependent on coal and other non-renewable sources such as gas, it is increasingly becoming more difficult for the government to play a leading role in sustaining low-carbon communities. An important point raised by Mwakasonda (2007:21) is that "the South African government does not have emission reduction targets, hence the reluctance among policy makers in taking robust plans toward achieving a low-carbon society". As noted earlier on, the private sector and economic factors do exert a lot of pressure on the government such that there may not be adequate responses from the government in addressing environmental-related issues. Inevitably so, the industrial and the business community command significant influence over most of the government decisions. On paper, the South African government has articulated the importance of a low-carbon economy that seeks to obtain economic growth at the cost of less natural resource utilization (Mwakasonda, 2007). This is illustrated in a study that sought to analyse the eThekwini Municipality's low-carbon innovations conducted by Scott et al (2012). The notion behind the concept of a low-carbon economy is to cut the country's greenhouse gas emissions while accelerating 'green-economy', with the overall aim of attaining a low-carbon society. Currently trends in South Africa show that the business community is inclined towards maximising short-term economic profits as opposed to supporting the essence of the low-carbon economy.

On the other hand, achieving a low carbon economy takes a very long time and it is highly linked to a relatively slow investment recovery. As a result, in some cases the business community tend to shy-away from the low carbon economy path in pursuit of the short-term profits. This was illustrated in a study conducted in New York in 2010 that sought to document 'global green building trends'. Reports from over 700 construction professionals were analysed and 80% of the participants cited the low investment recovery and higher upfront costs as obstacles to a low carbon

economy (Kats, 2010). This business community's attitude has had a very strong and negative influence on the government's willingness to implement mandatory climate change action programs. To this effect, many researchers and scholars have started to regard the 'ecological-citizen' as the ultimate alternative in addressing looming environmental problems. Hence, the incredulity and lack of willingness to change in the government and the business/industrial community pave way for other communities to be considered. The other communities are the urban resident community, namely 'households' and the university community.

2.5 Households as 'vehicles' for low carbon communities

A significant number of studies and research within the context of energy conservation have been focused on household energy utilisation. Over the past decade, studies aimed at analysing and encouraging energy conservation within households have received immense support from both the state and the private sector. This is part of the realisation that households have the ability to make an important contribution to the establishments of low carbon communities. For Heiskanen et al (2010), low carbon communities can only be achieved if individuals within society assume the role of citizens rather than that of merely consumers. This will then go a long way in developing a new understanding for the energy end-user's behavioural change amongst individuals within their households.

Gibson et al (2011) asserts that households have the potential to contribute to in low carbon communities because they comprise of families and individuals who are bound by social ties. The major advantage of this social compact is that any energy conservation initiative introduced will address a wider audience as opposed to being centred on the individual. In a family setting, attitudes and behaviours can easily be passed on between the family members because of the close bond and compassion they share. Correspondingly, Jackson (2004) suggests that most energy conservation programmes have failed to materialize simply because they focused on the individual and failed to acknowledge that individuals in communities do not make decisions in isolation. Thus, an individual's effort and actions to conserve energy in shared spaces would be futile unless others participate. Moreover, Heiskanen et al (2010:7586) added that "energy related behaviour is shaped by conventions and socio-technical infrastructures that are largely beyond individual control". Therefore, households constitute an important target group that has the ability to conserve energy and reduce environmental degradation as well (Abrahamse et al, 2005).

2.5.1 Households promoting energy conservation

It is worth noting that home appliance consumption of electricity carries a relatively large carbon footprint and can strain the already stretched electricity grid resulting in supply shortages (Cabeza et al, 2014:193). Abrahamse et al (2007) in accordance note that households can make an important contribution to energy conservation as they are in direct use of electrical energy due to their consumption patterns. Energy is utilized within households in various ways that include cooking, water heating and lighting amidst the usage of many other electrical appliances (Steg, 2008). Steg (2008) outline that individuals within households can be motivated to conserve energy mostly by adopting energy saving behaviours, a view supported by Lo et al (2012) that energy consumption reductions by means of energy saving behaviours are in fact viable and feasible. Therefore, the central argument advanced is that the effectiveness of technical innovations aimed at conserving energy is highly dependable on the household member's attitudes and behaviours towards its utilization. Furthermore, Lo et al (2012:227) argues that "people have the ability to undermine the efficiency of any innovation or initiative that is aimed at reducing energy consumption by their behaviour". One is then justified in contending that the introduction of energy-efficient appliances will not easily translate into a reduction of the overall energy consumption unless households are motivated to embrace the notions of 'ecological citizenship'.

In a study in Australia, Hobson (2006) focusing on the productiveness of eco-efficient technologies introduced to households as part of the Australian government 'Green-Home' project, highlights the importance of personal behaviour and attitudes. To this end, people within households were enrolled into an eco-modernisation project that involved the usage of recycling bins, shower timers and energy saving bulbs. Typically, the success and the failure of any participating household was solely determined by that particular households' attitude and behaviour towards the operation of the introduced eco-efficient technologies (Hobson, 2006). It is such findings that prompted Owens and Driffill (2008:4412) to argue that "much emphasis should be placed on household's behavioural change in order to attain step-changes in energy efficiency and to secure a sustainable energy supply for the future".

Linked to evidence highlighted above, Abrahamse et al (2005) note that energy consumption in households keeps rising mostly due to the energy intensive appliances used within households and economic growth coupled with an increase in households' income. These points were also

highlighted by Cabeza et al (2014) who analysed the growing trends of electricity consumption by investigating home appliances' utilization. According to Cabeza et al (2014:189) "the continuing demand for new advanced appliances with new functionality is resulting in rapidly increasing electricity consumption in households". In concluding their study, Cabeza et al (2014) echoed the findings of Abrahamse et al (2005) by stating that energy usage in residential homes is driven by population growth, incomes and energy prices.

2.5.2 The effect of feedbacks on household energy consumption

Energy feedbacks play an important role in motivating households to conserve energy because they make people aware of how their daily activities at home are contributing to energy conservation (Abrahamse, 2007). The provision of information about energy saving to households goes a long way in equipping them with knowledge that will encourage them to reduce their energy consumption. According to Steg (2008) people generally know little regarding how much energy they use particularly those households situated within master-metered apartments. A study conducted by Abrahamse et al (2005) clearly demonstrated the effect of feedbacks, whereby participants who were provided with feedback regarding their energy consumption saved more energy compared to those who did not receive feedback. The notion is that if people are made aware of their energy consumption patterns and how they are negatively impacting on the environment, they are more likely to alter their behaviours and lower their energy consumption levels.

A study in Australia also showed that those participants that were well aware of how their actions were contributing to the conservation of energy were more likely to conduct themselves in an environmentally-friendly way (Hobson, 2006). Similarly, a case study with EcoTeams (small groups of households) in Netherlands that was done over five months documented significant changes in energy–related behaviours and energy use on those households who received group energy feedbacks (Staats et al, 2004). In their study, Abrahamse et al (2005) also emphasized the importance of information in motivating and influencing pro-environmental behavioural change amongst people. Thus, the "households that received an energy-saving booklet and a shower device reported implementing the energy-saving tips more often than households which did not receive the booklet" (Abrahamse et al, 2005:276). Based on the above mentioned studies conducted by different authors in different places, it is clear that research feedbacks and energy-

saving information are paramount in encouraging households to engage in energy-saving behaviour. In support, Owens and Driffill (2008:4414) clearly advocated for "more interactive, deliberative communication between decision-makers, technical experts, different stakeholders and the public if genuine energy conservation is to be realized".

2.6 The academic community

The academia or the university community is mostly composed of students, teaching staff and administrators. Notably, the university community tend to be perceived as a 'tiny-piece' of the puzzle enclosed within a big maze of the energy crisis. Thus, issues of the energy crisis and environmental degradation have been mainly focused on the industrial and the urban residential sector. As a result, only a few energy-studies have considered students' energy consumption patterns and behaviour. However, recent studies by Kagawa (2007) and DeWater and Powers (2011) in Australia and USA respectively have shown how universities are playing an important role in addressing the energy crisis. In presenting their findings, DeWaters and Powers (2011:1699) argued that "the energy path can no longer be determined by professionals and politicians but by every citizen in society particularly students". According to Dahle and Neumayer (2001:3) "in a time faced with the increasing environmental challenges, the university community is now being recognized as viable alternative to take on the leadership for environmental protection". In analysing the long term effects of environmental field trips, Farmer et al (2007) were convinced that students can be catalysts for the changes that are essential for mitigating the energy crisis. For Schelly et al (2011), the ever increasing economic costs and the aggravated concerns over energy consumption patterns in communities have presented universities as an ideal sphere for targeted conservation efforts. On the other hand, Kagawa (2007:320) argues that "greening universities will stimulate student-led sustainability projects that will have great impact on and beyond the campus environment of students". For instance, the Turkish government in its effort to contribute to the reduction of the energy crisis embarked on programs that targeted and empowered Turkish students regarding environmental issues (Kilinc et al, 2008). Therefore, students constitute an important group that can be equipped with knowledge and values of 'ecological citizenship'. So that in turn they can implement or incorporate these values in their personal and professional lives in the future.

2.6.1 Creating a conservation culture amongst students

Stimulating an energy conservation culture within universities is a necessity because it carries the double-effect of cutting down on energy consumption and also on the institutional energy costs. More so, an energy conservation culture will encourage students to embrace environmentally responsible behaviour in their daily activities. As a result, "many universities are bolstering their efforts to contain utility costs and are developing new sustainability projects to curb the escalating energy expenses" (Hignite, 2008:64). This position was well supported by Marans and Edelstein (2010) who articulated that over 600 universities in the USA have signed on to the President's Climate Commitment initiative since its introduction in 2006. According to Schelly et al (2011:316) "the rising energy cost, the shrinking universities' budgets can be easily reduced through conservation efforts from the academia community". The argument presented here simply shows that energy use within universities comes at a substantial expense that can be reduced by encouraging students to conserve energy. A study done by Marcell et al (2004) outlined that the primary barriers to the creation of a conservation culture amongst students were knowledge gaps and their level of awareness towards environmental issues.

2.6.2 Energy literacy in universities

DeWaters and Powers (2011:1700) regarded "an energy literate individual as someone who has a thorough understanding of the impact that energy production and consumption has on the environment". Energy literacy is a vital possession able to empower students and communities around them to become sympathetic to the need for conserving energy in their everyday life activities. Evidence from a study conducted by Levy and Marans (2012) highlighted that the understanding of environmental issues positively influences the likelihood of people to undertake environmentally responsible actions. In their analysis, Levy and Marans (2012) further state that there are two types of knowledge that underline the concept of energy literacy. There is the knowledge of the problem which is referred to as declarative knowledge and then procedural knowledge, the know-how of addressing the identified problem (Levy and Marans, 2012:368). Now, both the declarative and the procedural knowledge are important in affecting behaviour change towards conserving energy within universities. Above all, Bittle et al (2009) cited in DeWaters and Powers (2011) conclude by stating that the lack of energy literacy could be the greatest challenge communities are facing on energy-related issues, more than economic and

technical challenges. This is so because the effectiveness and success of any technical innovation to reduce energy consumption is largely determined by the people's attitude towards its utilization.

Brewer et al (2011) also argue that the mitigation of the energy crisis will require people to understand how their energy consumption patterns are contributing to the energy crisis. In spite of the importance of energy literacy, a significant number studies have shown that energy related knowledge is exceptionally low amongst individuals (DeWaters and Powers, 2011). For instance, in a telephone survey conducted by the Natural Environmental Education and Training Foundation (NEETF) in 2002, only 12 percent of the 1500 adults interviewed passed a basic energy quiz (DeWaters and Powers, 2011). Another study by an environmental agency involving a random sample of 1001 adults regards the low energy literacy as a major barrier in curbing the energy crisis (DeWaters and Powers, 2011). In addition, a case study of the University of Michigan's energy conservation programs showed that lack of energy feedback and energy related knowledge resulted in the high consumption of energy (Marans and Edelstein, 2010).

A comparative study in Australia between Griffith University and the University of Plymouth finds that the latter was far advanced in terms of conserving energy. This was so because students at the University of Plymouth were actively involved in the energy-campus initiatives and 90 percent from the 1 889 interviewed had a positive attitude towards environmental issues (Kagawa, 2007). In contrast, a research on Griffith University students' knowledge of energy and environmental issues was minimal, so was their involvement around energy-related projects (Kagawa, 2007). Most universities particularly in the USA "now require their students to complete a course in environmental issues in order for them to graduate" (Levy and Marans, 2012:370). This is mainly done to present students with opportunities for them to widen their scope around environmental and energy issues. In a case that sought to document the experiences of students on the implementation of a campus-lead sustainability initiative at the College of Charleston in America. Owens and Halfacre-Hitchcock (2006) also indicate the importance of raising student awareness and environmental knowledge for the success of such initiatives within universities.

Energy literacy is therefore fundamental but not the only tool in curbing the escalating energy crisis. In other words, providing information does not automatically translate into behavioural change. This point was proven by Geller (1981) who conducted an inquiry into the behavioural

change of people who were attending a weekly 3-hour energy workshop for a month. Afterwards 40 attendants were randomly selected in order to evaluate their willingness to embrace the principles of 'ecological citizenship'. The study shows that only a few had installed the low-flow showerheads distributed during the workshops and were altering their behaviours in line with the workshops objectives (Geller, 1981). In presenting their findings, Kollmus and Agyeman (2002) highlight that increasing an individual's environmental knowledge does not simply result in individual behavioural change. Likewise, Brewer et al (2011) in their analysis of a dormitory energy competition notes that information distributed to students cannot guarantee behavioural change. Rather, "commitments and pledges are the most powerful incentives for behavioural change that can complement energy literacy" (Brewer et al, 2011:8).

2.6.3 Limitation to low carbon campuses

It is important to note that students residing within the university premises pay a flat-accommodation fee that does not change in spite of their energy consumption. Consequently, any reduction in electricity usage by students within the universities does not directly translate into a financial benefit for them (Brewer et al, 2011). On the other hand, the lack of energy monthly bills makes resident students completely ignorant of their energy usage. In some cases, this can prevent students from reducing their energy consumption as they are not aware of how much energy they will be using. This supposition was well illustrated in Brewer et al (2011:2) asserting that "if one cannot measure electricity usage, it is then difficult to try conserving it". Therefore, the provision of energy feedbacks to students is the backbone to any conservation initiative that attempts to reduce energy consumption amongst resident students. Apart from receiving feedback, students can play an important role in combating the energy crisis if they are educated about the causes, impacts and solutions to climate change (Lorenzon et al, 2007).

Another drawback linked to campus energy conservation projects is that students are not actively involved in the formulation of such projects, rather they are reduced to 'subjects'. Thus, students are in most cases expected to simply implement decisions that would have already been decided by the institutions' management. In their study, Jiang et al (2013) noted that it is difficult to build a low carbon campus when students are not fully engaged right from the initial stages. They went on to further criticize the Fudan University's approach because most of its energy policies were developed by top management without student leadership input (Jiang et al, 2013). Similarly, a

case study of the University of Michigan's energy program showed that a significant number of students were not even aware of the university's efforts to reduce energy consumption (Marans and Edelstein, 2010). Energy conservation measures are therefore insufficient to curb energy consumption if students are not actively engaged in the process. When students actively participate in campus energy projects, they also become more interested in environmental issues and this can influence their consumption trends. This was clearly illustrated by Zelezny (1999:9) who argued that "active participant involvement is positively related to effectiveness in improving environmental behaviour". Thus, the empowerment of behaviour change cannot be achieved through top-down methods of being instructed what to do (Kaplan, 2000). Rather, students are more likely to alter their behaviour when they are well informed about energy issues, participate in developing energy conservation programmes and when they realise that their actions can make a difference.

2.6.4 Students energy consumption patterns

Jiang et al (2013) finds that in a university setting, over 95 percent of energy consumption is consumed in buildings and the residential halls consumes a significant percentage of that 95 percent. Therefore, it is important to consider how energy is utilized in order to gain a better understanding of students' attitudes and practices towards energy consumption. A dormitory energy competition between four college campuses residential halls showed that students' behaviour have an impact on the university's energy consumption patterns (Brewer et al, 2011). Similarly, findings from a study at the University of Cape Town (UCT) indicated that electricity consumption by students in the university residences had a significant impact on the carbon footprint at UCT (Letete et al, 2011:7).

One of the most prominent behaviour that researchers tend to attribute to high electricity usage by students is not switching off lights and computers. For instance, a survey done at the University of Michigan showed that 40 percent of the participants never switched off their computers and lights even during the day (Marans and Edelstein, 2010). Findings from a study that involved 3 708 students noted that "66 percent stated that they turn off the lights when leaving a room but only 38 percent turn off their computers" (DeWaters and Powers, 2011:1705). A pilot study by Marcell et al (2004) echoed the same findings by reporting that most students do not leave their lights on but almost 80 percent of them 'nearly always' leave their computers on. From the discussed findings

it is clear that students have a high degree of control over how electricity is utilized within the residences and their environmental awareness influences how they operate their electrical gadgets (Petersen et al, 2007).

2.7 Conclusion

This chapter has engaged literature explaining and analysing the relationship between environmental issues and the role that ordinary citizens can play in lessening the current environmental issues. Firstly, the chapter discussed EC theory that was developed by Dobson (2003) which is based on social justice, responsibility and compassion for environmental issues by individuals. The theory predicts and explain the willingness of individuals within society to take 'little' bold steps in conserving the natural environment by embracing pro-environmental behaviours such as saving electrical energy in their daily activities. Secondly, the chapter further outlined the importance of EC to this study by demonstrating how EC can be employed as a framework in documenting and analysing students' attitudes and behaviour towards their usage of energy within their residential spaces.

The literature reviewed demonstrated how the state has over the years struggled to sufficiently address issues encompassing the environmental and energy crisis. This has led to a call for the establishment of low carbon communities and low carbon cities as illustrated by Scott et al (2012). Nevertheless, the reluctance of the business community to pioneer the idea of low carbon communities has been attributed to their quest for the maximisation of economic profits through means that tend to oppose the essence of a low carbon economy. This then elevated households as 'vehicles' for a low carbon society. Different commentators have shown how households can contribute immensely to energy conservation programs as they are in direct use of their electricity. Within the household arena, it was noted that energy feed-backs to households are vital because they make members of the households aware of their energy consumption patterns so that they can actually implement specific measures to conserve energy.

Lastly, the chapter assessed the academic or the university community that is mostly composed of students and the teaching staff. It used recent literature drawn from various case studies to illustrated how universities are now playing an important role in the mitigation of the current energy crisis. The different literature reviewed highlighted the importance of creating a

conservation culture amongst students arguing that conserving energy will not only be beneficial in terms of reducing the universities' utility costs but it will have a positive impact on the environmental sustainability. On the same time, there has been a growing consensus that environmental education can be a fundamental tool in raising awareness amongst students regarding environmental issues. Environmental education is crucial amongst the academic community because a significant amount of energy is consumed in universities' buildings.

Chapter Three: Contextual background of the study area

3.1 Introduction

This chapter discusses the contextual background of the study through exploring the management of electricity by the eThekwini municipality and the University of KwaZulu-Natal (UKZN) management. Firstly, a descriptive overview of the industrial sector within and around Durban will be analyzed. In this undertaking, the chapter highlights the contribution of industrial sector to the economy of Durban and the paradoxical effect of environmental degradation due to energy intensity. The scope and the state of electricity supply in Durban will be examined together with the role that the eThekwini municipality plays in the distribution of electricity to its end-users. Furthermore, the chapter provides a review of both the macro and micro approaches employed by the eThekwini municipality that are aimed at reducing energy consumption. The importance of adopting participatory approaches which incorporate citizens efforts by the municipality will be appraised. Efforts by the eThekwini Municipality towards fostering the notion of a 'low carbon society' through the lobbying for 'ecological citizenship' will also be discussed. Emphasis will be placed on the municipality projects that seek to raise environmental awareness within the learning institution because that is the focus of this study.

A description of the setting of the study area (UKZN) is provided, followed by a brief overview of UKZN's regulations towards energy and environmental issues. Secondary data was used to demonstrate the discrepancies between the university's environmental policy and lack of enthusiasm amongst students in creating a 'green campus'. The environmental assessment employed in this chapter will seek to explain the low levels of environmental awareness amongst students and the consequences that this has in undermining the realization of a 'low carbon university'. Literature from previous studies conducted on students' attitudes and behaviour towards environmental issues will be considered and the Talloires Declaration will be used as a benchmark. Lastly, the chapter will illustrate how energy is utilized and managed in UKZN residential halls using data from key authors, Govender, (2005) and Singh (2010) who analyzed UKZN's energy consumption patterns. The UKZN Energy Management Program's (EMP) initiatives and innovations that have resulted in the reduction of UKZN's utilities bills will be reviewed as well.

3.2 Welcome to Durban – 'Sharp Zinto'

3.2.1 Positioning Durban and its industries

Durban is one of the largest port City on the Eastern-African seaboard making it a key economic contributor to both its province and the country at large. According to Thambiran and Diab, (2011b:6660) "the metropolitan area of Durban is the third largest urban area in South Africa and its industries contribute to over 22 percent of the City's Gross Domestic Product (GDP)". The notable industries located within Durban include "a paper and pulp manufacturer, a large number of chemical industries, two petroleum refineries and the largest motor vehicle manufacturer in Southern Africa" (Thambiran and Diab, 2011b:6660). Apart from being a major contributor to the economy of the city, the industrial sector in Durban is also a significant user of energy. In support of this assertion, Mwakasonda (2007) highlighted that the industrial sector is considered to be the sector with the highest energy demand, and it is also the biggest contributor of GHG emissions in the country. This position is supported by Yamin (2007) who argues that cities are the major emitters of GHG accounting to more than 50 percent of the global GHG emissions. Therefore, Durban industries do not only exert pressure on the country's electricity grid but they also have a huge negative impact on the natural environment as illustrated by Yamin (2007).

3.2.2 The scope and state of electricity supply in Durban

eThekwini Municipality supplies electricity to more than 711 096 customers in an area covering nearly 2 000 square kilometers (eThekwini Municipality, 2014). The eThekwini Municipality like all other entities in South Africa purchases its electricity from Eskom. Thus, "electricity is purchased by the city authorities from Eskom and it is then distributed to the different sectors within and around the city" (Thambiran and Diab, 2011b:6661). Eskom can be viewed as a legislated private entity that possesses the exclusive authority to sell and transmit electricity to distributors and end-users within South Africa (Roberts, 2010). The eThekwini municipality purchases approximately 11 000gwh of power from Eskom at 275 000 volts which it then distributes to its customers (eThekwini Municipality, 2014). Over the years, this role administered by the municipality has been blemished by the shortfalls in terms of electricity supply due to the energy crisis which are not only peculiar to Durban but rather to South Africa and the rest of the continent.

The current energy crisis makes it difficult for Eskom to balance the escalating energy demand from its customers and the energy supply side. As a result, since 2004 there has been an increasing caution from Eskom and the government for the industrial sector to reduce its electrical energy consumption at least by 10 percent (Roberts, 2010). However, data compiled between 2007 and 2008 show that only 45 percent of industries reduced their electricity consumption and this reduction was not even near the targeted 10 percent but rather it was merely 3 percent (Thambiran and Diab, 2011b). This reluctance or inability of industries to reduce their energy consumption by 10 percent coupled with the increasing residential energy usage has resulted in Eskom and the municipalities introducing a number of measures such as the on-going load-shedding in an effort to avert a total energy catastrophe.

Within this context of an energy crisis, the city authorities have implemented a number of programs aimed at reducing electricity consumption both on the macro and micro level. This is highlighted in the 2012/2013 eThekwini Municipality Annual report which reveals how the municipality's marketing division is continuously holding interactive events to promote energy conservation initiatives (eThekwini Municipality, 2014). In addition, the report compiled by ASSAf (2011) argues that the City made a clear commitment in its approaches to identify and implement energy conservation measures that will consequently result in the reduction of electricity consumption by its different consumers. In his review of the 2011 ASSAf report, Ribbink (2012:109) likewise enforces that "the overall goal of the report is to identify key areas of intervention that would position Durban on a pathway towards becoming a low carbon city".

3.2.3 eThekwini Municipality on energy crisis

In spite of facing the pressure of many social issues, particularly those around service delivery to local communities, local municipalities within South Africa play a vital role in the formulation and implementation of policies to curb power shortages. The South African Constitution mandates the national government to set a broad policy framework that allows local municipalities to formulate and implement their own pro-environmental and energy programs (South African Constitution Act 108 of 1996). It is to this effect that the eThekwini municipality has managed to develop and initiate the Municipal Climate Protection Program (MCPP). According to Roberts (2010) the MCPP is an effective strategy that is aimed at curbing the GHG emissions and also addressing the energy crisis facing the city. MCPP is an initiative employed by the eThekwini Municipality as it

endeavors to meet the "national government's goal of reducing electricity consumption by 10 percent due to the looming energy crisis in South Africa" (Roberts, 2010:399).

Apart from the MCPP, the eThekwini municipality has also embraced the blueprint of the United Nations Industrial Development Organization (UNIDO). A significant number of environmentalists such as Roberts (2010) view the UNIDO initiative as an important tool in fostering the promotion of a low carbon city economy in Durban. The magnitude and importance of the industrial sector in Durban has already been outlined earlier on. UNIDO is there to assume the role of a 'watchdog' in ensuring that the industrial activities and processes do not increase environmental depletion in the city. A low carbon city within the scope of UNIDO is one that is geared towards the reduction of carbon emissions through using energy more efficiently (ASSAf, 2011).

For Fawkes (2005), energy efficiency within the industrial sector can potentially save about 20 percent of the current industrial energy consumption. It can also significantly reduce GHG emissions. This estimation is supported by the Energy Department of South Africa which states that energy efficiency results in the reduction of energy consumption and it also lessens the impact of energy use on the environment (Department of Mineral & Energy, 2004). Therefore, MCPP and UNIDO are some of the strategies employed by the eThekwini Municipality that highlight the willingness of the municipality to positively respond to the energy crisis. Moreover, the municipality also engages and encourages local communities to participate in its energy crisis intervention programs as stipulated by the Integrated Development Plan (IDP) (eThekwini Municipality, 2014). Other cities in South Africa are adopting a similar approach as, "the City of Cape Town has actually used the ongoing load shedding as an entry point for municipal officials to spark some public debate and even initiate energy conservation programs in schools and households" (Mokwena, 2009:24). Clearly, the energy crisis, particularly the ongoing load shedding has sensitized both the local municipalities and their citizens towards embracing ecological citizenship practices.

3.2.4 eThekwini's instrumental approach in curbing energy crisis

According to Scott et al (2012) an instrumental approach within the context of energy conservation mainly explicates how individual behaviour and attitudes can be influenced to be pro-

environmental. Some commentators in the same field such as Latta (2007b) regard ecological citizenship as an instrumental approach that strives to impart individuals with 'green attitudes' so that they become more responsible for their usage of energy. Thus, apart from targeting the industrial sector in Durban, eThekwini Municipality also acknowledges the important role that households play in the mitigation of the current energy crisis. In line with this assertion, a significant number of measures have already been formulated, and implemented at the household level. At a national level for example, the Department of Energy rolled-out an awareness campaign termed 'Appliance Labeling Campaign' that sought to sensitize individuals about their energy consumption patterns through labeling their households' appliance (Department of Mineral and Energy, 2004). The labeling of household appliances is to stimulate awareness amongst individuals by showing them how their home appliances actually consume energy and how best they can lessen the consumption as well.

Eskom has been a leading advocate for mutual efforts from all electricity users particularly households to reduce their energy consumption and conserve energy (Eskom, 2011). Likewise, Ribbink (2012:110) suggests that "remedial actions for the energy crisis need to be driven by people and municipalities should raise awareness and commits themselves to promote low carbon citizenry". At the launch of the presidency energy saving campaign the President Mr Jacob Zuma called on every individual to contribute to the energy saving program by conserving energy in their offices and homes (*Times Live*, 13 March 2015). Now in an effort to stimulate the principles of low carbon citizenry, eThekwini Municipality has also targeted learning institutions for energy conservation initiatives. In its 2012/2013 annual report, the municipality demonstrated how students can be agents of pro-environmental behavioural change and it highlighted how the marketing department has been dispatched to primary, secondary and tertiary learning institutions in that regard (eThekwini Municipality, 2014). This approach employed by eThekwini Municipality is also evident in the Japan-UK low carbon society program that sought to identify ways in which the government can facilitate the transformation of different societies to low carbon societies. During the course of the program, it was argued that the government has a mandate of providing information to encourage its citizens so that they embrace 'green practices' (Skea and Nishioka, 2008). Therefore, eThekwini Municipality is justified to consider students in its approaches because "the academia population provides it with an opportunity to influence the behaviour of a large population with the possible outcome of teaching behaviour that supports a

life-style which reduce energy consumption and carbon emissions" (Jiang et al, 2013:613). It is to this effect that this study focused on the University of KwaZulu-Natal in order to document students' practices and attitudes towards energy consumption within their residential premises.

3.3 Outlining the context of the University of KwaZulu-Natal

3.3.1 Description of the setting of the study area

The University of KwaZulu-Natal (UKZN) is situated in the province of KwaZulu-Natal. It is comprised of five campuses namely Howard College, Westville campus, Pietermaritzburg campus, Edgewood campus and the Nelson Mandela School of Medicine. UKZN has a large student population of 45 498 full-time registered students. UKZN is a product of a merger between the former universities of Durban-Westville and Natal. The merger was part of the national government's restructuring plan to decrease the number of higher education institutions in the country from 36 to 21 (UKZN, 2015a). Prior to the merger, the University of Natal had illustrious on-going recycling projects amongst its students and staff because of its unique environmental policy that was ratified in 1998. Sadly, the merger that saw the formation of UKZN in January 2004 proved to be detrimental to the greening initiatives as green projects and campaigns became vague and lost momentum (Singh, 2010). According to Singh (2010) when the environmental quality of UKZN was assessed after 2004, it was considered to be relatively poor and there were no documented recycling projects or initiatives aimed at reducing the university's carbon footprint.

However, in recent years there has been a rise in greening projects dubbed 'Greening UKZN' and the aim of these projects is to stimulate environmental awareness amongst UKZN's students and staff members. Unfortunately, these 'greening' activities have failed to yield the desired results mostly due to the lack of enthusiasm and support from the students. Govender (2005) states that issues pertaining to environmental and energy campaigns at UKZN are not considered critical, neither are they prioritized at the institution by the students' body. It is to this effect that the 'Greening UKZN' campaign has targeted students so that they can be involved in its initiative to create environmental awareness around the university (UKZN, 2015b).

'Greening UKZN' campaign. Source: UKZN (2015b)

3.3.2 The UKZN Environmental Policy

Apart from the on-going environmental campaigns convened by a group of concerned students and staff members, UKZN has an environmental policy that is easily accessible from the university website. Unfortunately, the primary data collected from this study and the statistics provided by the Greening UKZN campaign shows that a significant number of students are not aware that UKZN has an Environmental policy. After assessing the awareness of UKZN students towards environmental issues, James (2014:149) concludes that "building knowledge and awareness of climate change and its possible mitigation may go a long way in creating a platform for action". Thus, one of the UKZN environmental policy's objectives is directed towards providing holistic education to both students and staff in an effort to promote environmental awareness and fostering a culture of conserving the natural environmental (UKZN, 2015c). The UKZN environmental policy is framed by 14 principles that the university seeks to achieve through teaching, community engagement and research. The three principles that are most relevant to this study are (UKZN, 2015c):

- *Principle 4 – The University shall encourage full use of its campuses as sites for all aspects of environmental education and for conducting environmental research for the benefit to the community.*
- *Principle 5 – The University shall recognize and encourage creativity within the student body which may be directed towards conservation initiatives or sustainable developmental programs, student participation shall be promoted.*
- *Principle 6 – The University recognizing the direct and indirect costs of land, water, energy and materials shall take appropriate steps to minimize wasteful utilization of these resources.*

The UKZN environmental policy places more emphasis on the involvement and participation of students in environmental issues in order to curb environmental degradation. In support of this assertion, Cortese (2003:19) contends that if students are made aware of their ecological impact they are more likely to act in an environmentally sustainable manner. Cortese's (2003) assertion is well illustrated in the inception of the 'Greening UKZN' campaign.

> *"We are all aware of global environmental deterioration, and the critical issues of lack of water and energy here in South Africa. But are we doing something ourselves to combat the environmental crisis? As an initiative to spark environmental awareness on Howard College, a group of concerned students and staff has decided to do something to make a change and has launched the 'Greening UKZN Campaign'" (UKZN, 2015c:1).*

It is important to highlight that in spite of providing the 14 principles towards fostering a low carbon campus, the UKZN environmental policy does not outline the specific actions that should be taken by the academic community. Hence, there is need for the policy makers to provide guidelines and to propose specific actions that both students and staff should undertake in line with the university's environmental policy. Rather, it is a document that sets out 14 key principles that the university management pledge to follow and observe in order to create a conducive atmosphere for its staff and students to initiate pro-environmental programs. This highlights the willingness of UKZN to join other universities in supporting the movement of 'Sustainable Universities' as coined by Cortese (2003). According to Maistry (2012) there appears to be a notable rise of

'sustainable campus initiatives' across the globe and a significant number of universities are already focusing on conserving the natural environmental. Many authors such as Singh (2010), Govender (2005), Maistry (2012) and Cortese (2003) have attributed the sustainable campus movement to the signing of the 1990 Talloires Declaration by the academic community.

3.3.3 Sustainable future leadership – The Talloires Declaration

Universities across the world impact significantly on the natural environment due to the huge number of learners that they enroll and accommodate. Lukman et al (2009) states that there are more than 13 000 higher education institutions in the world and the global student population is over 18 million people. Singh (2010) notes that there are 23 public higher education institutions in South Africa and the population of both students and staff members is approximately 850 000. It is clear from these assertions that the university community has a considerable carbon footprint and its activities directly and indirectly affects the environment. As a result, there have been major advances and initiatives within the academic sector that are aim at reducing campus carbon footprints and conserving energy. The most prominent initiative is the '1990 Talloires Declaration' that calls for its member-institutions' full commitment towards conserving the environment through implementing pro-environmental measures and educational programs. The most outstanding feature of the 'Talloires Declaration' is its 10-point action plan that is aimed at incorporating sustainability and environmental literacy in teaching and research within higher educational institutions (ULSF, 2015:1).

The Declaration is instrumental in persuading universities to pursue programs within their campuses, which are directed towards attaining environmental sustainability. More so by virtue of being signatories to the '1990 Talloires Declaration' the universities are held accountable over time (ULSF, 2015). UKZN is a signatory to the Talloires Declaration and its environmental policy reflects the proposed 10-point action plan particularly the first four which are:

- *Increase awareness of environmentally sustainable development*
- *Create an institutional culture of sustainability*
- *Educate for environmental responsible citizenship*
- *Practice institutional ecology* (ULSF, 2015:1).

Thus, UKZN management ought to play a leading role in raising awareness and environmental knowledge to its students and staff members so that they can be motivated to be 'ecological citizens' within and beyond campus life.

3.3.4 The University residence halls and energy management

UKZN accommodates its students in both university owned and leased residences. The competition for residential spaces is very high amongst students. In 2014 the university accommodated 11 788 students, an increase from the 11 505 students that were accommodated in the university's residences in 2013 (UKZN, 2015d). All UKZN on-campus residential halls have access control entrances. Students are accommodated in single rooms, with shared areas including lounges, television rooms, laundry rooms, kitchens and bathrooms. UKZN residences are self-catering, thus students residing in them have direct control over their energy consumption patterns as they are the end-users of electricity in these shared spaces. Electricity consumption is very high at UKZN and it commands a significant percentage to the university's annual utility budget.

In 2005 after conducting an energy audit, Govender (2005) states that UKZN spent about R8 million yearly on electricity expenditure. Eight years later, Greg Diana quoted by Knox (2013:1) noted that "UKZN uses some R100 million per annum to cater for 90GWh of electricity consumed by the university". The energy audit conducted by Govender (2005) also show that UKZN residences at Howard College (one of the five campuses) alone account for approximately 20 percent of the total energy cost. This position was echoed by Petersen et al (2007) who stated that two-thirds of the total global energy used, is consumed in houses and residential spaces. At UKZN, Heating Ventilation and Air Conditioning (HVAC) accounts for about 60 – 65 percent of energy usage, hot water ranges between 10 – 15 percent, lastly lighting and general office use accounts for 20 – 30 percent (Knox, 2013). Energy consumption at UKZN tends to escalate yearly in spite of the different measures employed by the management to promote energy conservation behaviour amongst its students.

Presently, most of the energy conservation programs at UKZN are initiated by the Energy Management program (EMP) which has its laboratory located at Howard College. EMP monitors both energy and water consumption across the five campuses and it has installed the metering system in all the residences as part of its monitoring process. EMP has been instrumental in probing

ways in which the university can reduce its energy consumption and also in raising awareness amongst students. The EMP has contributed towards reducing the university's energy costs, thereby lowering the campus carbon footprint. For instance, the replacement of the showerheads with low-flow showerheads in all campuses by the EMP resulted in UKZN saving approximately R4 million on its utility bills just a year after completion (Knox, 2013). Other initiatives carried out by the EMP include the enhancement of the HVAC system to reduce energy consumption and the installation of heat pumps in the university residences. Energy management is paramount in increasing energy efficiency in a campus setting. For example, the University of Memphis through its energy management program managed to save $75 000 in utility costs by replacing an old central boiler and also by employing the use of primary chilled water in their HVAC (Hellums, 2008). In the 2014 annual report, the UKZN management commended the EMP for its effective initiatives and interventions that have significantly reduced energy consumption and saved over R8 million in the process (UKZN, 2015d: 82).

The lighting system at UKZN contributes significantly to the total cost of energy. According to Govender (2005:98) the university "spends over R4 million towards electricity usage on the lighting system on a yearly basis". The EMP has played a significant role in reducing energy usage in terms of the lighting system at UKZN. Thus, EMP has managed to replace all the 60W incandescent light bulbs in every residential room and replaced them with the Compact Fluorescent Lights (CFLS) (Govender, 2005). In support, the students' residence department has placed notices that encourage students to switch off their lights and electrical appliances when they are not in use (UKZN, 2015e). In a bid to conserve energy, the residence officials have put in place rules that prohibit the use of 'high-power' electrical appliances within all UKZN residences. The residence department calls for total support from students in its effort to conserve energy and furthermore it clearly specifies that students may not use electrical heaters, hot plates and kettles in their rooms (UKZN, 2015e). However, the ineffective monitoring and enforcing of these regulation, has resulted in students using these prohibited appliances within their rooms as revealed by the primary data gathered in this study.

3.4 Conclusion

This chapter has presented the contextual background of the study giving details on the management of energy by both the eThekwini Municipality and the UKZN management. The

chapter outlined the current energy crisis and some of the measures that are being employed in conserving the natural environment and to reduce energy consumption. The discussion in the latter parts of the chapter showed that there is much work to be done in raising energy awareness amongst students. Thus, the realization of any meaningful energy intervention at UKZN is dependent on the willingness of the student population to modify their attitudes and behavior in a way that embraces the notions of 'ecological citizenship'. The secondary data used in this chapter demonstrated how energy consumption has escalated over the years, especially within student residences and how the EMP has used energy saving technology to curb energy use.

Chapter Four: Methodology

4.1 Introduction

This chapter first discusses the research methodology used in this study to collect data from the participants. Its main focus is on the research design, the sampling methods used, the data collection methods and data analysis. Lastly, the chapter outlines the method of inquiry utilized for this study, which includes both the primary and secondary data. Figure 4.1 below gives a comprehensive summary of the methodology chapter.

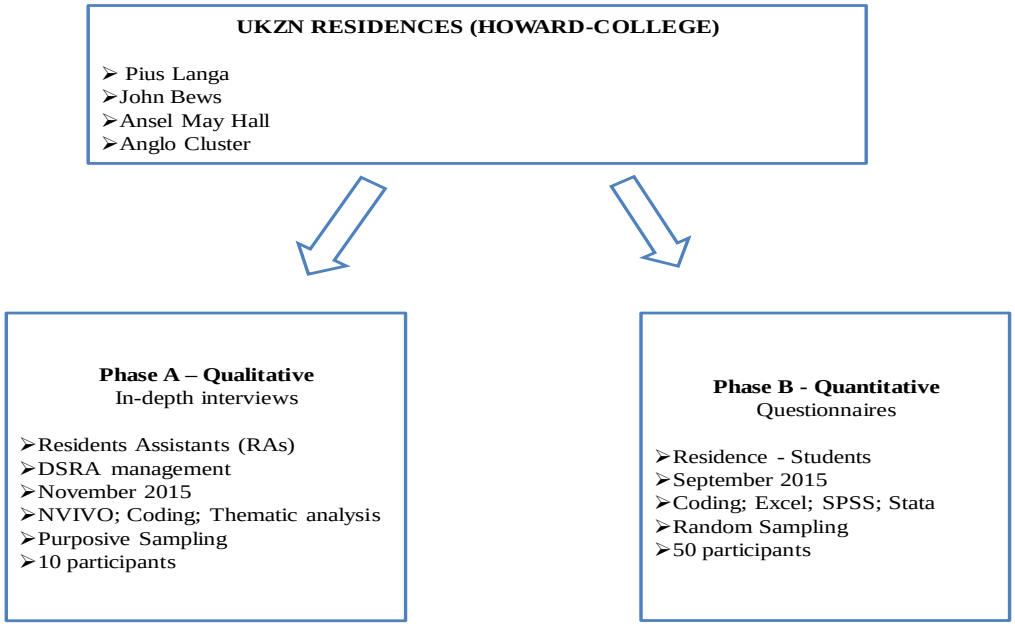

Figure 4.1: Graphical representation of the research methodology

4.2 Research methodology

In spite of the notable differences between quantitative and qualitative research methods, this study used both methods to gather a holistic understanding of students' attitudes and practices towards energy consumption, thereby employing a mixed methods approach. A mixed methods approach employs both a qualitative and a quantitative methodology enabling the researcher to have a better understanding of the issue under study (McNamara, 2010). This study used the mixed methods approach in order to explore students' behaviour, practices and attitudes pertaining to energy

consumption. Similarly, Horhota et al (2014), whose study was aimed at identifying behavioural barriers to campus sustainability, used the mixed methods approach. In their conclusion they stated that "the mixed methods approach provided a holistic insight and textured picture of the sustainability climate within a university campus" (Horhota et al, 2014:344). A significant number of studies (Meerah et al, 2010; Cotton et al, 2015; Kaplan, 2015; Mainstry, 2014; Parece et al, 2013) on students' attitudes and behaviours around issues of energy usage, environmental sustainability and ecological citizens in a campus setting used the mixed methods technique. The researcher used the mixed methods approach in order to enhance the credibility and completeness of the findings. The mixed methods inquiry also enabled the researcher to produce a more comprehensive account pertaining to students' behaviour and attitudes towards electrical energy usage in a university setting.

The use of a mixed methods approach is exhibited in the data analysis and interpretation chapter that follow, whereby the researcher combined the data collected in the interviews and questionnaires. During the data collection process, the two approaches were used separately in phases to complement each other (see Figure 4.1). Thus, this chapter discusses the qualitative (phase A) and quantitative (phase B) methods separately.

4.3 Case Study: UKZN

The use of case studies is very common particularly in the qualitative paradigm. Case studies are lauded for their notion of narrowing down a broad field of study into a single researchable topic. For Denscombe (2003), case studies are important for testing hypotheses and they tend to offer a more realistic presentation of the real world than merely statistical surveys. Thus, case studies are very admissible in a university setting particularly when one is interested in issues around campus sustainability. Rosenbloom (2010) argues that case studies at universities are relevant because they provide insight into the programs being implemented and the connotations associated with the implementation, monitoring and evaluation of such programs. In support, many studies that focused on universities' environmental and sustainability issues used case studies (Marcell et al, 2004; Jagers, 2009; Schelly et al, 2011; Petersen et al, 2007; Kahler, 2003; Cotton et al, 2015; Maiorano and Savan, 2015). However, case studies have been widely criticized because findings gathered from them cannot always be generalized to a wider population.

This study used UKZN as a case study and the rationale behind its selection was the fact that the researcher had an 'insider' perspective. The researcher had been at the institution for six years and has also worked as a resident assistant within the Department of Student Residence Affairs (DSRA). This aided easy communication with key stakeholders and facilitated a good rapport between the researcher and the stakeholders. Using UKZN as a case study was compatible with the mixed methods approach, enabling the researcher to employ different data sources in the investigation of energy management at UKZN. Primary data was gathered from the DSRA officials and registered students residing within the on-campus residences at Howard College.

4.4 Primary Sources of Data

The study aimed to analyze students' practices and perceptions towards energy consumption within UKZN's residences. In order to do so it was essential to employ the mixed methods approach as outlined above. A mixed methods approach was appropriate and in line with the aims of the study since the data collected was directed towards addressing the research questions. Thus, qualitative in-depth interviews were used to understand students' behaviour, attitudes and also to document their experiences regarding energy utilization in their respective residences. On the other hand, questionnaires were administered to students in an effort to quantify and comprehend their daily practices regarding energy consumption. Consequently, the in-depth interviews and the self-administered questionnaires were the sources of primary data.

4.5 Secondary Sources of Data

Secondary data refers to data collected and analyzed by other researchers that was used in this 'energy conservation' study by the researcher. The secondary sources of data for this study were derived from journal articles, published books, online sources, newspapers, government and municipality documents. Reports on energy and environmental conservation initiatives at UKZN were also important secondary sources for this study. Secondary sources were essential for the construction of Chapter Two whereby the researcher reviewed and discussed the literature that was relevant to the study.

4.6 Qualitative approach

Corbin and Strauss (2008:11) defines qualitative analysis as "a process of examining and interpreting data in order to elicit meaning, gain understanding and develop knowledge". For Bless et al (2013) the strength of qualitative methods is in qualifying words and descriptions in order to investigate and document notions of social reality. This reflects the social constructivist paradigm that considers the individuals' ability to create a world around them through their everyday experiences (Mottier, 2005). A qualitative approach is essential in understanding the lived experiences and views of participants because it enables the researcher to gain an 'insider' perspective regarding the study area (Smith and Osborn, 2008). A qualitative approach is regarded as both dialectic and interpretive as it is mainly associated with the interaction between the researcher and the participant(s) as the former unpacks the latter's lived experiences. Hence, reality is constructed and interpreted from the way the participants' feel and think about the phenomenon under study.

This study used a qualitative approach in recording the students' attitudes and behaviour towards energy consumption because this approach focuses on the valuation of attitudes, behaviours and opinions of individuals. Therefore, a qualitative approach was vital in the assessment of factors that influence energy management amongst students and DSRA officials at UKZN. The paucity of studies on students' behaviours and practices towards sustainability issues at UKZN consequently called for a qualitative methodology in an effort to gain deeper insight into students' behaviours. According to Bless et al (2013), qualitative inquiry mainly explores individuals' behaviours and it seeks to understand the rationale framing of individuals' behaviour s and actions. A qualitative approach was employed in the study because of its flexibility and descriptive quality that enabled the researcher to gain an understanding of students' behaviours, practices and attitudes regarding energy usage. A deeper understanding of the various aspects that influence students to act in a certain way towards energy consumption could only be documented through employing a qualitative approach.

4.6.1 Sampling

Sampling is process associated with gathering data when one is conducting research on a very large population. Cohen et al (2007) defines the population as the larger group or a class of subject,

concepts or phenomenon from where a sample is derived by the researcher. A sample is regarded as a small but representative collection of units from a general population used to conclude facts about that population (Bless et al, 2013). In essence, these definitions clearly outline that a sample is regarded as a subset of the general population. Sampling becomes a logical way of selecting a sample by the researcher. Bless et al (2013) defines sampling as a strategy for deciding which people, settings, events and social processes are to be researchable in a way that represents the population of interest. De Vos (1998) highlights that the two main advantages of sampling are that it enables the researcher to restrict the investigation to a small but well-chosen group and it gives results with known accuracy. For this phase, the study was conducted using purposive sampling which is a non-probability sampling method. For Bless et al (2013), a non-probability sampling method involves the conscious selection of the sample to be included in the study. The notion behind purposive sampling is that the researcher purposefully selects participants that are considered most valuable and rich in information.

The purposive sampling method was appropriate in recruiting participants for this study because it enabled the researcher to identify the key participants. Firstly, the four residences in this study were primarily selected because they had working electricity meters installed by the UKZN energy management. Secondly, they were on-campus residences that accommodated students with different and specific categories that were important for the study. The different categories that these four residences offered were the diversity in age, gender, level of study and academic qualification pursued by the students. Consequently, the Residents Assistants (RAs) from these selected residence halls qualified to be part of the study provided they met the required criteria. RAs are postgraduate students that are employed on part-time basis by the residence department to assist and administer to students in their respective residences. RAs are in direct contact with all students staying in the residence and they are tasked with implementing developmental programs with their students.

4.6.2 Number in sample

For a RA to be included in the study he or she should had stayed in the university's residence for at least four years and should had stayed in three different residences. The researcher specifically needed to interview RAs who fell in that category because they were able to articulate and describe students' perceptions or behaviour towards energy usage within the residence halls. In addition,

RAs who would had stayed for more than four years in the university residences could easily outline the different trends exhibited by students in relation to energy utilization. To this effect, five RAs were purposefully selected because they resided in the targeted residences and they met the specified criteria fully. Other key informants for this study were the two Asset and Building officers who are responsible for the maintenance work in the residences. The university's electrical contractor for both the residences and the university's building manager was also included in the study. Lastly, two technicians from the UKZN Energy Management office were included in the study.

4.6.2.1 Tables of participants

Table 1: Residences

Name of the Residence	Gender of students accommodated	Description
Pius Langa	Both males and females	Predominantly undergraduate students
John Bews	Females	Mixed
Ansel May Hall	Males	Mixed
Anglo cluster	Both males and females	Predominantly postgraduate students

Table 2: Residence Assistants

Name	Number of years in residence	Number of residences previously stayed	Name of residences previously stayed
RA1	6 years	3	Mable Palmer, Pius Langa & John Bews

RA2	6 years	3	San Sable, Anglo Cluster & Albert Luthuli
RA3	7 years	3	Albert Luthuli, Ansel May & Anglo Cluster
RA4	6 years	4	Khayelitsha, Congela, Pius Langa, Mable Palmer & re-admitted at Pius Langa
RA5	7 years	4	Westville campus (Oval residence), Pius Langa, Ansel May & Mabel Palmer

Table 3: Residence Management

Name	**Portfolio**
Pipi	Asset & Building Officer
Jojo	Residence manager
Buddie	UKZN electrician – Howard College contractor
Hassan	UKZN Energy Management
Dudu	UKZN Energy Management

NB. Please note that all the names used in this study are all pseudonyms to protect the identity of participants.

4.6.3 In-depth interviews

According to Bless et al (2013:193) "an interview is a way of collecting information directly from the participant and it mainly involves direct personal contact between the researcher and the participant". During an interview the participant will be asked to respond to the research questions being asked by the researcher. Burgess (1984) describes an in-depth interview as a form of conversation that is interactive in nature. The researcher should aim to encourage the participant to express his/her views freely when responding to the research questions. For this to be achievable, the researcher must be a good listener and should strive to create a good rapport with the interviewee. A good rapport will also put the interviewee at ease such that he/she will be comfortable to talk freely. An interview is essential in qualitative research because it gives the participants the freedom to expand more on the topic as they see fit, whilst creating a platform for the researcher to probe or to ask for clarification (Bless et al, 2013).

In-depth interviews were suitable for this study because the researcher was interested in exploring students' attitudes and behaviours towards energy usage within a university residential setting. Through the interviews, the participants were able to freely share their experiences, views and thoughts regarding energy consumption. The flexible nature of the in-depth interviews ensured an influx of information from the participants. Consequently, it enabled the researcher to collect 'rich-thick' data from the participants and this contributed immensely to the quality of the data gathered.

4.6.4 Broad type of questions

The RAs and the DSRA officials were important groups in the study as they were highly knowledgeable about the issues around the management of resources in the university's residences. In order to capture the different issues associated with energy management and its utilization, the researcher used two different sets of interview guides on the two groups. The RAs' interview guide firstly asked them to discuss the general environmental issues they were aware of and how they became aware of those issues. Afterwards, the RAs had to state the different residences they had previously resided-in, then based on their stay they were required to explain the trends associated with students' behaviours towards energy usage in those residences. RAs are figures of authority in residences, hence the researcher also wanted to note how they enforce the university's regulations and rules around energy usage. More so, the researcher was interested in the

implementation, monitoring and evaluation of 'energy conservation' initiatives or programs in residences spearheaded by RAs. RAs were also asked to highlight issues of energy crisis and load-shedding and explain the impacts they have on students residing in the residences. Lastly, RAs were tasked with identifying how students can help in the mitigation of the energy crisis.

The DSRA officials were asked to outline their different portfolios, stating their duties and responsibilities in the students' residence department. They had to note the critical resources needed in residences and discuss the general issues within UKZN residences. They were tasked with explaining how energy is managed and the regulations around energy utilization in residences. They were asked to highlight the correlation between energy usage and department's expenditure in that regard. DSRA officials were also asked to explain the impacts of load-shedding on both students and managerial duties. The last questions were aimed at outlining the DSRA's efforts towards energy conservation within the university's residences. Lastly, participants were asked to discussion their opinions regarding the idea of making 'Environmental Education' a core module for all students.

4.6.5 Interview process

The in-depth interviews held with RAs and residential officials were semi-structured and largely conversational to encourage them to freely share their experiences and opinions. The researcher's role was merely to facilitate the interviews in a way that allowed the participants to freely express their views, while still answering the main research questions. It was easy to establish a good rapport between the researcher and the interviewees because both parties were colleagues in the DSRA. Nevertheless, this meant that the researcher had to steer some of the interviews back to the research topic because some interviewees strayed away from the topic. The interview process was highly interactive and interesting particularly with the RAs as they would share their experiences firstly as students, and also as student assistants. Interviews with RAs were conducted in their residential flats whilst the DSRA officials' interviews were held in their respective offices.

After being granted the permission to conduct the study by the UKZN ethics committee and the DSRA, the researcher dispatched letters of invitation to the selected participants. Appointments were then made with the consent of the participants. The interviews were conducted between the 5th and 28th of November 2015 and they were between 20 and 60 minutes in duration. Prior to the

commencement of each interview, the researcher explained the purpose of the study and asked the participants to sign the informed consent forms. All interviews were recorded with the consent of the interviewees and then afterwards the interviews were transcribed.

4.6.6 Some limitations: feedback process

The interviews were conducted during a period characterized by widespread student protests instigated by a rise in university fees. As a result, some of the interviews with the DSRA officials had to be re-scheduled due to the university's stakeholders' meetings. However, the major limitation was the unavailability of one of the Asset & Building officers who is responsible for all the maintenance issues. The researcher had to wait for two weeks because it was essential to interview that particular Asset & Building officer. Another notable limitation that emerged during the interviews with RAs was that some of them became too emotional and personal about the questions and as such that they could have conveyed inaccurate information.

4.6.7 Possibility of participant bias

This researcher and the participants were former colleagues in the DSRA given that this researcher served as a RA for two years. The RAs in this study had only served for a year hence some of them held the researcher in high esteem. To some of extent, some RAs could have withdrawn some important information on the research topic in fear of reproach. More so, some could have used that opportunity to impress the researcher with their responses instead of articulating the real information. In spite of all these, the researcher made efforts to minimize participant bias by standardizing the interview guide, ensuring privacy and probing non-directive answers. The researcher also made sure that the participants understood the importance of the study and emphasized the importance of their contribution. The positionality of the researcher and the way this may have influenced the study is therefore explained and acknowledged here.

4.6.8 Analysis of data

Data analysis is a process of making sense of the collected data and it is a crucial stage before the dissemination of information. Thematic analysis was used to analyze the data collected from the interviews. According to Braun and Clarke (2013) thematic analysis is a qualitative analytic tool employed to identify, analyze and report themes within the collected data. All the recorded interviews files were transferred to a laptop and Microsoft Word was used for transcription. During

the transcription, all RAs names were replaced with numerical numbers whilst the DSRA officials were assigned pseudonyms. Transcriptions were further cleaned by removing all the information that could easily be used to identify the interviewees such as residence names. The researcher then took time to read the transcripts thoroughly in order to identify and develop broad themes. At this stage, the researcher also used the memo writing technique to keep a record of ideas and thoughts whilst developing themes. NVIVO, a qualitative data analysis computer software programme was then used to help manage the interview transcripts. Transcripts were imported into NVIVO for coding. Sub-themes emerging from the responses were identified and grouped under the main themes. The themes addressing the research topic and questions were then integrated and used as the potential themes for data analysis.

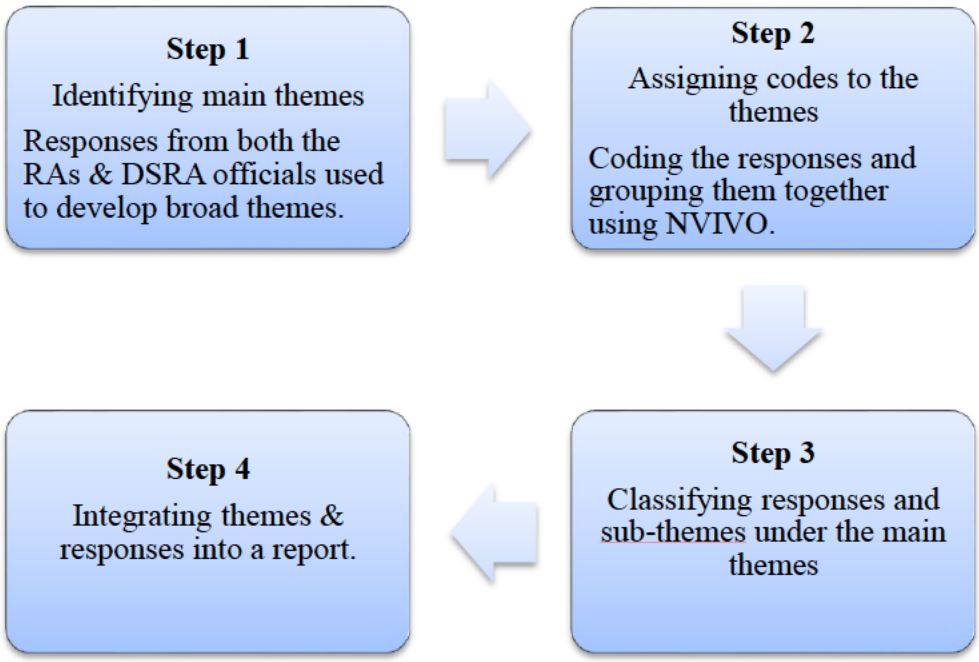

Figure 4.2: Steps in data analysis

4.6.9 Ensuring trustworthiness

The criteria used to determine validity and reliability within a qualitative approach are not applicable to the quantitative approach. According to Talbot (1995:428) "qualitative research is trustworthy when it accurately represents the experience of the study participants". The participants' experience can only be meticulously represented if the participant regards the study finding as being credible. Therefore, credibility is another key aspect that can enhance the trustworthiness of qualitative results. Likewise, Shenton (2004:64) contends that "ensuring credibility is one of the most important factors in establishing trustworthiness". Apart from capturing the real experiences of the participants, credibility also seeks to insure that the study actually measures what was intended. In order to achieve credibility, the researcher made sure that the questions and the methodology used in the study were in line with the study objectives. Data collection and data analysis techniques were cognate from a good comparable study that used the University of Johannesburg as a case study (Mainstry, 2014).

Credibility in qualitative research is further enhanced through prolonged engagement with the subject matter and the participants by the researcher (Shenton, 2004). The further prolonged engagement with the participants enables the researcher to establish a good rapport with the participants, in order to minimize distortion of information. The researcher was able to build trust with the participants because both parties had worked together in the DSRA department and participants were encouraged to discuss their experiences freely. Students' residence issues at UKZN are closely linked hence the researcher used probes and also rephrased some questions to check for distortion of information or falsehoods when analyzing data. The researcher was also cautious about the formulation of the research questions in an effort to ensure validity. There were no leading questions or double barrel questions and questions were asked in the simplest way possible. Triangulation was also of paramount importance in ensuring the trustworthiness of the study.

4.6.10 Triangulation

Triangulation is an effective strategy that enhances trustworthiness of research findings through the use of multiple sources and this also minimizes systematic bias (Bless et al, 2013). Cohen et al (2007:112) defines triangulation as "the use of two or more methods of data collection in a study.

In addition, triangulation is a powerful way of demonstrated concurrent validity in qualitative research". Triangulation was the backbone of this study because of the mixed methods approach employed. The study was aimed at documenting the attitudes, behaviour and practices of students towards energy consumption hence reliance on one approach may had led to bias and distortion of reality. However, the coherence of results from the energy questionnaires and the in-depth interviews went a long way in ensuring credibility of the research findings. Bowen (2009:28) views triangulation as a valuable feature in research work because of its ability to "to reduce the impact of potential biases that can exist in a single methodology".

4.7 Quantitative approach

A quantitative approach "deals largely with numbers and statistics in the analysis and interpretation of research findings" (Bless et al, 2013:16). For Golafshani (2003) a quantitative researcher delimits a phenomenon under study into common or measurable categories that can be generalized to all the subjects in a similar situation. Thus, a quantitative approach allows the researcher to statistically collect and analyze data obtained from a relatively small sample so that the results can be generalized to the whole population. A quantitative approach was important to this study because it enabled the researcher to gather data from a large sample of students thus broadening the study and enhancing the generalization of the research findings. The researcher was able to administer energy questionnaires to the targeted students within the prescribed timeframe. Quantitative tools were useful in determining and outlining students' practices that escalated or conserved electrical energy within the UKZN residences. Through employing quantitative tools, the researcher was able to measure and document how energy was being utilized by the different stakeholders. Nevertheless, the results obtained from the quantitative tools provided less detail regarding the students' behaviors and attitudes towards energy consumption. Hence, the researcher used both qualitative and quantitative approaches so that both methods could corroborate each other.

4.7.1 Data Collection

The instrument that was used to gather data from the participants for this phase was a self-designed questionnaire that consisted of 22 questions. De Vos (1998:89) defined a questionnaire "as an instrument with open or closed questions to which a respondent must react". A questionnaire was

viable as far as the documentation and exploration of students' practices towards energy usage in residential halls was concerned due to many reasons. Firstly, a questionnaire is easily standardized thus it reduces bias as questions will be presented in a consistent way to all participants. Secondly, it is easy to attain a high response rate when one is using questionnaires as they are distributed and collected by the researcher. Thirdly, a questionnaire appeals more to university students due to their studying schedules because it requires less time and energy for one to complete it. More so, a questionnaire is advantageous to the researcher because it is cost effective and data can be collected from a large sample in a short period of time. It is also easy for the researcher to analyze the responses from participants as most of the questions would be 'closed-ended'.

The questionnaire that was used in this study had both 'open-ended' and 'closed-ended' questions. The 'open-ended' questions provided more detailed information as students were asked to respond in writing down their responses, whilst on the 'closed-ended' questions students simply ticked on the provided options that were pre-determined by the researcher. The 'open-ended' questions provided more diverse responses regarding students' practices and attitudes towards energy consumption within their residences. For Bless et al (2013) 'open-ended' questions in a questionnaire give the participants freedom to actually express their answers in a way they wish to. The 'open-ended' questions were included in order to make students to respond to the questions in their own words so that the researcher could document their practices and attitude towards energy usage. On the other hand, 'closed-ended' questions were included in order to outline students' practices and also for students to rank electricity consumption of their appliances. 'Closed-ended' questions formed the crux of the questionnaire because they were easy to administer and also to analyze. As a result, the 'closed-ended' questions proved to more efficient as students answered all the questions whilst some of the 'open-ended' questions were either briefly answered or left unanswered.

4.7.2 Sampling

As noted earlier on, sampling is a strategy that is logically and deliberately employed in order to decide and select participants that will provide the needed information on the subject matter. For Denscombe (2003) sampling in quantitative research is designed to increase chances of drawing a representative sample whilst minimizing the costs associated with data collection. In this phase, the study was conducted using the simple random sampling technique which falls under probability

sampling. Bless et al (2013) states that in probability sampling, a sample is randomly selected and each member of the population under study has a known chance of being selected to participate in the study. The study population consisted of registered students at UKZN Howard College who resided in on-campus residential halls. From this defined student population, a convenience sample of 50 students was selected randomly from the four identified residential halls. Simple random sampling meant that each student residing in the identified residential halls had an equal chance to be selected and participate in the study. Bless et al (2013) highlights that probability samples have a much higher quality because, when properly constructed they are representative of the population.

4.7.3 Design of the questionnaire

The questionnaire was constructed in English language since it is one of the main official languages of the University hence the targeted group (students) understood it well. The questionnaire can be regarded as a 'filter questionnaire' because it started with specific issues related to energy usage within the university's residences and later on led to more general questions on demographics (Bless et al, 2013). This was done mostly to instill confidence in the students and to make them start responding to the 'open-ended' questions while they were still eager to provide detailed responses. The 'open-ended' questions focused on capturing students' views, knowledge and perceptions towards energy related matters in their residences. The factual questions that were towards the end of the questionnaire were meant to document the demographics of the students such as gender, level of study, degree and age. The demographic information was important to the researcher in the interpretation of the findings, to analyze whether the level of study, age or even gender had any influence on students' usage of electrical energy.

The questionnaire included mainly Likert scale questions, designed to assess the satisfaction level of students towards the resources and services rendered to them by the University. These questions were further employed to identify the electrical appliances on which the most energy was used in the university residences. Given the nature of the participants and also the type of the questions asked, the researcher was concerned that he could encounter a response-set. Response-set refers to the tendency of participants to answer all questions asked in a specific direction regardless of the content of the questions (Bless et al, 2013). In an effort to avoid response-set, the researcher integrated both the 'open-ended' and the 'closed-ended' questions within the questionnaire.

4.7.4 Ensuring the questionnaire's quality

The researcher's supervisor was very helpful in identifying and rectifying potential flaws especially on the vocabulary used in the questionnaire. Thus, by virtue of the questionnaire being centered on energy-related questions, some of the questions tend to contain technical expressions and sophisticated grammar that could have led to confusion amongst some students. Therefore, the supervisor's input was essential in the formulation of the questions. The researcher also pre-tested the questionnaire on some of his colleagues to verify if the questions were asked in an appropriate and understandable manner.

4.7.5 Collecting data: Procedure

As highlighted earlier on, all UKZN on-campus residential halls have access control so once access was granted questionnaires were personally distributed to students by the researcher. The researcher randomly gave the questionnaires to students for them to complete, thereby using the approach of a convenience sample. Students were mostly found in the common places such as TV room, kitchens, laundry rooms, corridors and in their rooms. After signing the informed consent form, students were given the questionnaire to complete and most of them preferred to fill it in their rooms. Students were given time to complete on their own and the researcher was there to provide clarity if needed. A clearly highlighted instruction on how students were to complete the questionnaire was provided. The response rate was high mainly due to the nature of the questions and also the fact that the researcher personally distributed and collected the questionnaire upon completion.

4.7.6 Some limitations

The main limitation was around validity and accuracy whereby students in the study could had answered the questionnaire the way they think will appeal to the researcher. As a result, this could have undermined the accuracy and validity of the data collected as the students' responses would not be reflecting their true opinions. The researcher also felt that valuable information could have been lost especially on the unstructured questions sections. Where students were required to explain or elaborate some of their responses in order for the researcher to gather more information on their practices and attitudes towards energy consumption, more detailed explanations were

provided. The limitation was that most answers provided were brief and a few questions were not answered nevertheless all the structured questions were answered.

4.7.7 Data analysis

Data collected through the questionnaires was entered into an excel spreadsheet by means of coding and then imported into computerized analysis software. For data analysis, the researcher utilized the 'Statistical Package for Social Scientist version 11.0 for windows' (SPSS) and also STATA version 13. After imputing the data, the researcher cleaned the data by removing and deleting errors and later on labeled the variables. SPSS also expedited advanced analysis of data such as cross-tabulation and measurement of central tendency or mean. Thus, data was analyzed by utilizing descriptive statistics and frequency tables generated from SPSS. Information from the frequency tables was also exported to excel in order to formulate graphical representation of the data. Cross-tabulation was employed to verify if there was a statistically significant relationship between independent and dependent variables. The questionnaires administered in this study also had 'open-ended' questions that sought to capture detailed responses from students. Responses to the 'open-ended' questions were coded and analyzed through content analysis so that the emerging themes and concepts could be quantified. According to Polit and Hungler (1995:209) "content analysis is a process of analyzing verbal or written communication in a systematic way in order to measure variables quantitatively". Lastly, the emerging themes, frequency tables and the graphs from excel were triangulated against the data from interviews then integrated into a report.

4.7.8 Reliability

Reliability within quantitative methods considers the "degree of consistency with which an instrument measures the attribute it is designed to measure" (Polit and Hungler, 1993:445). Reliability within a quantitative approach is dependent on the consistency of measures. A reliable instrument will always project the same result whenever it is used to measure an unchanging value. The questionnaires that were administered to students showed consistency in the students' responses despite the fact that students were selected from different residential halls. Reliability in this study was enhanced by minimizing data collector bias because the researcher solely administered the questionnaires to students. All students were treated the same and the researcher strived to project similar personal attributes that encompassed friendliness and attentiveness to all

the students. The questionnaires were in simple English and confidentiality was achieved because no names were required, students were only asked to state their residence name.

4.7.9 Validity

Validity involves checking and verifying what the research instrument actually measures (Bless et al, 2013). According to Cohen et al (2007:105) "quantitative data validity is greatly improved through careful sampling, appropriate instrumentation and appropriate statistical treatments of the data". Phase B of the study was mainly focused on documenting students' practices and behaviour al traits towards energy consumption. Hence the energy questionnaire that was used was mainly characterized by ranking and scale-questions in order to determine the energy consumption trend. The four residential halls were carefully selected, Ansel May is a predominately undergraduate male student residence whilst John Bews houses female undergraduate students. Pius Langa is a mixed residence for undergraduate students and Anglo cluster is a mixed residence for postgraduate students. In ensuring validity, data obtained from questionnaires was analyzed using SPSS, STATA and excel.

4.7.10 Ethical Considerations

Research needs to be guided by and adhere to the 'ethical values' in order to protect and reduce 'harm' on the participants. Thus, the researcher should consider the principles of ethical research which includes confidentiality, non-maleficence, anonymity, justice and fidelity (Bless et al, 2013). This is only attained if the study is based on mutual trust, honesty and integrity that calls for the researcher to recognize and protect the participant's dignity and rights. Most importantly, the researcher should obtain the informed consent of the participants prior to data collection.

For this study, the researcher was firstly given written permission to conduct the study by the UKZN registrar. Secondly, permission to conduct the study in the university's residences was granted by the UKZN Howard College Residence Co-coordinator. Afterwards, ethical clearance for the researcher to conduct the research was sought and obtained from the UKZN ethics committee. Prior to the data collection phase the researcher clearly explained the study to all participants so that they would have a clear understanding of the study. Participants were also informed that participation in the study was voluntary and that they could withdraw their participation freely at any point without penalty. Participants were informed about confidentiality

and anonymity hence no names were required. Participants were informed that few verbatim responses would be used during the data analysis phase nevertheless the protection of their identity would be maintained at all times through the use of pseudonyms. Lastly, all participants were required to sign the informed consent form prior to the commencement of each interview and the distribution of the questionnaires.

4.8 Conclusion

This chapter gives a detailed description and highlights reasons why the mixed methods approach was adopted in eliciting data for in this study. The chapter offers a description of the size and nature of the sample for the study. Furthermore, the chapter outlines the data collection and analysis procedures employed in this study. Lastly, the chapter articulated how ethics issues such as trustworthiness, validity and reliability were achieved.

Chapter Five: Results and Discussion

5.1 Introduction

This chapter presents and discusses the results of this research. The purpose of the study was to explore UKZN students' attitudes and behaviour towards energy consumption, using Ecological Citizenship (EC) as a theoretical frame. The study was framed around questions that were centered on energy conservation knowledge and practices of students residing in the on-campus residences at UKZN. The objectives of the study included explaining the students' energy consumption patterns, their environmental knowledge and practices regarding energy usage. The chapter integrates the results from the energy surveys and the in-depth interviews and discuss them in relation to the EC theory. Table 5.1 below shows the themes emerging from the study.

Theme:	**Sub themes:**
Participants Background	• Level of study, age, faculty, gender • Students' perceptions of on-campus residence services
Students' attitudes towards energy consumption	• Energy saving responsibilities at UKZN • Students' willingness to participate in greening initiatives • Motives for students' participation
Environmental education and awareness	• UKZN's commitment to the low carbon principles
Energy consumption patterns	• Electrical appliances within residences • Energy usage within residence's shared places
Students' practices and behaviour towards energy consumption	• Lights • Electrical plugs and appliances • Energy regulation measures

Table 5.1: Emerging themes from the study's results

The emerging themes illustrated in Table 5.1 will be interpreted in relation to EC theory. The chapter will unpack each theme by outlining the data gathered from this study. The themes will be discussed using the EC 'lens' to interpret students' practices towards energy consumption within the university's residences.

5.2 Participants' background

5.2.1 Demographic profile of students

This section briefly presents and discusses the demographic profile, featuring the age, gender, level of study and the field of study of students that participated in the study. The student sample for this study resided in on-campus residences with 56% of the students being males and 48% being females. According to the findings, the majority of the participants were undergraduate students (72%). Students in the second year of their studies made up 30% of that undergraduate's percentage. The remaining 28% comprised of postgraduate students. The majority of the students, 66% were in the College of Humanities, while 24% were from the College of Engineering and just 10% were in the College of Law. This is to be expected given that the residences are located in Howard College campus. The age distribution showed that half of the participants were in the age group 19-21, 32% in the 22-24 age group, followed by 16% in 25-27. Only 2% of the students were in the age group 16-18 whilst none of the participants was above the age of 27. Table 5.2 below shows a joint frequency distribution of age, level of study against the gender of students who participated in the study. Table 5.2 shows that the male students in the study were fairly distributed between the identified age intervals and the majority of the males were postgraduate students (38%). On the other hand, over half (63%) of female students were between the 19-21 age group and half, 50%, of the female students were in the second year of their studies.

Table 5.2: Socio-demographic characteristics of UKZN students, by gender

	Female (Percentage)	**Male**(Percentage)
Age intervals (in years)		
16-18	4	0
19-21	63	38
22-24	33	31
25-27	0	31
>28	0	0
Level of study (in years)		
First	8	23
Second	50	12
Third	17	15
Fourth	8	12
Postgraduate	17	38
Total	**100% (N=24)**	**100% (N=26)**

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

5.2.2 Students' perceptions of the on-campus residence services

On-campus residences at UKZN refer to student housing facilities built within the vicinity of the campus environment. On-campus residences are exclusively university owned buildings, assets and facilities that accommodate students. The university management is responsible for the supervision and management of students' activities in these buildings. Accommodation in on-campus residences is usually highly competitive due to a number of reasons that includes safety and its closeness to learning facilities. A study by Suki and Chowdhry (2015) showed that parents prefer their children to stay in on-campus residences to off-campus buildings because of safety and security concerns. Students tend to regard university residences as 'a home away from home' if they are satisfied with the services rendered to them and hence also prefer on-campus residences. They also reduce travelling costs.

Therefore, the quality of services offered to students play an important role in instilling that sense of belonging during their stay in the residences. Figure 5.1 below shows how students rated the residence services offered to them at UKZN. As illustrated by Figure 5.1 most students were highly satisfied with accommodation and electricity services, 72% and 96% respectively. More than half of the students (56%), were satisfied with the kitchen facilities and likewise 54% were satisfied with the security. However, 48% of the students were not satisfied with the water provision whilst 40% were happy with water supply and only 12% were neutral regarding water supply. As shown in Figure 5.1, the majority of students, 44% were not satisfied with internet access while 32% stated that they were satisfied with internet access and 24% were neutral in their response.

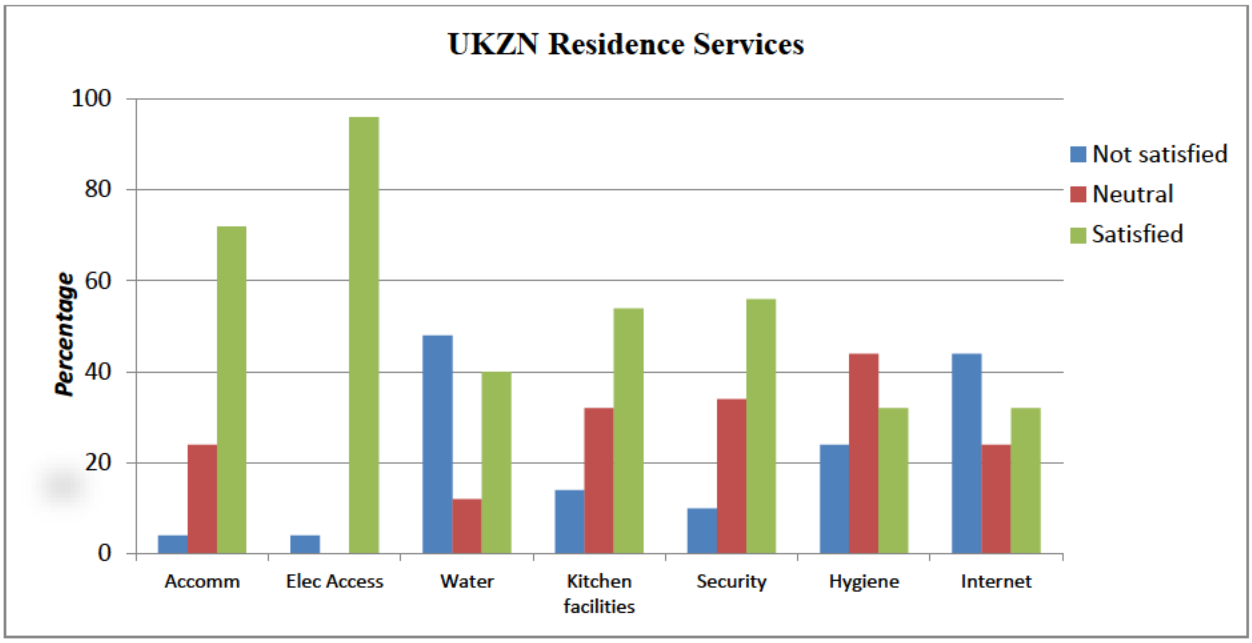

Figure 5.1 Satisfaction with residence services

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

The survey on UKZN residences services shows that accommodation and electricity access are rated as highly satisfactory by students. In contrast, students rated water provision and internet connection as unsatisfactory. The findings were consistent with Suki and Chowdhury's (2015) findings at a University in Malaysia, where students were very satisfied with electricity supply and the quality of furniture. Similarly, Suki and Chowdhury (2015:45) pointed out that "students were concerned about the floor that was not tiled and the plumbing system which resulted in water problems affected their satisfaction living in residence". Likewise, this study showed that a significant number of students at UKZN were not happy with one of the residences because of the 'poor' plumbing system that resulted in water shortages. This sentiment was explained by one of the Residence Assistants (RA) who noted that;

> *"The University is facing so many burst pipes because of old infrastructure and the old plumbing system that can no longer withstand the pressure that the municipality is putting. As a result, this residence and many others have been affected by water shortages now and again. The toilets were not flushing and students did not have water to drink raising issues of health. When the water comes back it is usually muddy and students are complaining about running tummies" (RA4, October 28, 2015).*

Notably, both students at UKZN and those in Malaysia (Suki and Chowdhury, 2015) regarded electricity supply as satisfactory. A study at Covenant University in Nigeria also showed that "the satisfaction from electricity was ranked highest with a mean 4.2037 and 79% of the students rated electricity supply as very satisfactory" (Oluwunmi and Izobo-Martins, 2012:107). It is interesting to note that students, particularly in Africa rated electricity supply as very satisfactory at a time when the continent was characterised by a sharp rise in energy imports and load-shedding. In its 2012/2013 report, eThekwini Municipality explained the paradox by demonstrating how the load-shedding initiative is geared towards protecting those sectors that are vital to the region's economic growth such as industries and public institutions (eThekwini Municipality, 2014).

This explains why public institutions such as hospitals and the universities were rarely affected by the load-shedding schedules. When asked about the effects of load shedding at UKZN, some students acknowledged the fact that UKZN hardly experienced load shedding. A student stated that

> ***"****The load shedding does not necessarily affect the university that much because we hardly have it here (UKZN)" (Student 20, September 7, 2015).*

In support of this assertion, data from the real-time meters monitoring energy and water consumption at UKZN showed that the University was only affected by load shedding ten times in 2014. As can be seen in Figure 5.2, load shedding was only intense in the first and last quarter of the 2014 academic year. All the zero (0) meter readings in Figure 5.2 are an illustration of load shedding. As can be seen in Figure 5.2 below the University seldom experienced load shedding at a time when most sectors in the country were constantly experiencing load shedding. This explains why the students, in spite of the looming energy crisis across South Africa, rated electricity supply as very satisfactory.

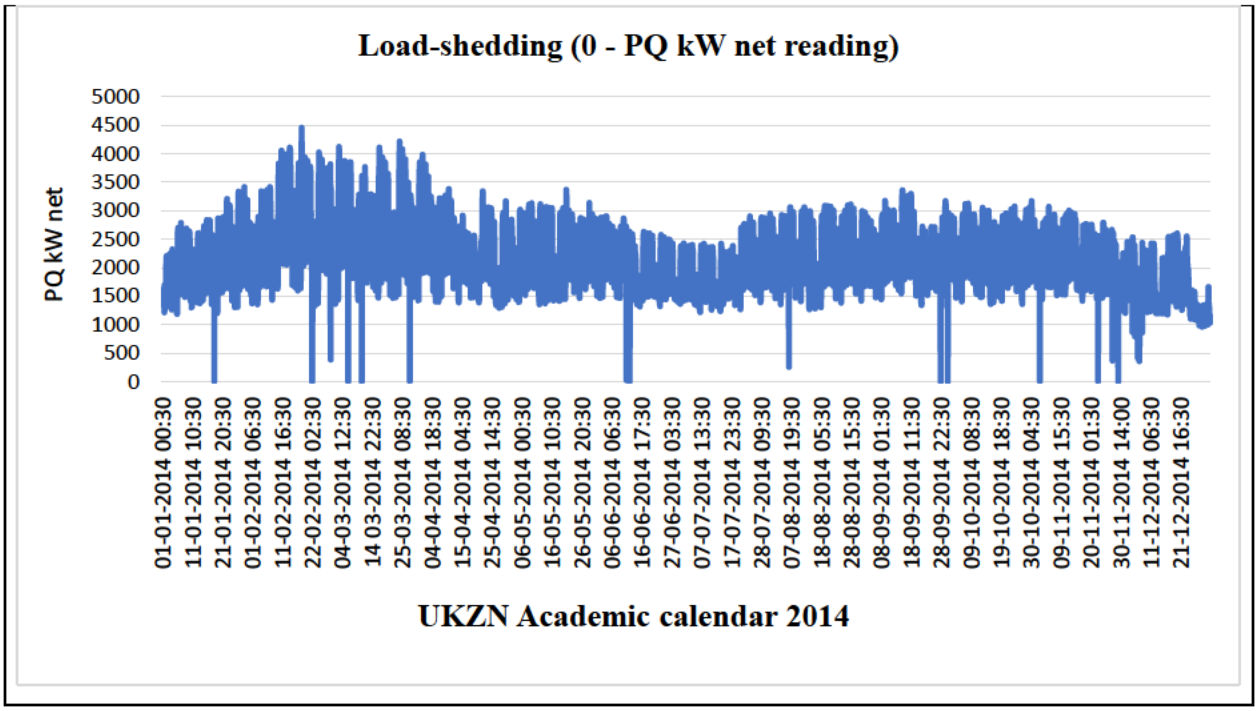

Figure 5.2 Load shedding at UKZN in 2014

Source: Real-time meter readings from UKZN Energy Management

Examining the level of satisfaction of students towards the residential services and facilities was important to the study, because the study focused on uncovering students' attitudes towards energy consumption in residences, in relation to other services. Radder and Han (2009) elaborates that conducive living conditions for students impacts both on their residential choices and attitudes. This stance illustrates that students' behaviour and attitudes in a campus environment tend to be shaped by their levels of satisfaction. In support of this stance, Suki and Chowdhury (2015:43) argue that "students' attitude is strongly affected by their satisfaction levels regarding hostel facilities". Thus, good residential facilities may positively affect students' satisfactory levels and create a positive attitude within students. Furthermore, Fares et al (2013) state that when students are satisfied with the quality of services provided, their loyalty to house rules is also enhanced. Chan et al, (2011) emphasized that if students are satisfied with their university residential services, they are prone to be loyal to their hostels. Therefore, students' satisfaction is not only confined to their behavioural traits but it has an influence on their willingness to observe university regulations on energy usage as articulated by Chan et al (2011).

5.3 Students' attitudes towards energy consumption

At the core of the Ecological Citizen (EC) theory is the recognition that pro-environmental attitudes and behaviours of individuals as central tenets to the theory itself (Dobson, 2003). EC as emphasized by Dobson (2003) is a normative green political theory that is rooted within a theory of transformation that advocates for sustainable lifestyles and livelihoods. Sustainable lifestyles and livelihoods are inseparable with 'green attitudes' thus individual attitudes play an important role as far as EC is concerned. It is on this notion that the contemporary debates on environmental issues focus on the individual's need to develop 'green attitudes' through encouraging him or her to embrace the EC's principles (Scott et al, 2012). Therefore, an analysis of students' attitudes was paramount in documenting their energy consumption patterns. According to the literature towards the environment, an individual's experiences, level of education, family and society shape their attitudes. The previous section also demonstrated through illustration, how the levels of satisfaction pertaining to services rendered by University residences could influence students' attitudes.

Lo et al (2012) demonstrates how attitudes and perceptions of an individual influence his or her choices, actions or behaviour. Attitudes were perceived as an individual's overall evaluation of his or her behaviour by Eagly and Chaiken (1993) cited in Lo et al (2012). Meerah et al (2010) defines attitudes as an expression of feelings and values that can make an individual be actively involved in an on-going project if his or her attitude is positive. Therefore, an individual can show his or her attitudes through his or her behaviour, values and actions. Attitudes are also expressible through one's opinions and words. Attitudes of students towards energy consumption were measured by documenting and analysing their willingness to participate in energy-related programs within their residential spaces. Students' attitudes were also documented by inquiring about aspects that motivate them to conserve energy. They were also asked questions around responsibilities regarding energy conservation in the residences. Questions around the perceived benefits of conserving energy in the residences also provided insight into the students' attitudes towards energy consumption at UKZN. Lastly, the in-depth interviews with DSRA officials and electricians that are working within the University residences were paramount to this section because interviewees were asked to describe students' attitudes in detail. In determining the

students' attitudes towards energy utilization, the study firstly sought to investigate if students assumed responsibilities regarding saving energy in their residences.

5.3.1 Energy saving responsibilities at UKZN

The energy questionnaires and the in-depth interview guide asked participants to state who was responsible for conserving energy at UKZN. Participants were also asked to explain their responses. Figure 5.3 below shows that the responses from students pertaining energy saving responsibilities at UKZN were distributed evenly across the three categories of management, students and both management and students. Data from the energy questionnaires shows that 34% noted that it was the students' responsibility to conserve energy within their residences. Similarly, 34% also stated that the onus to conserve electrical energy was on both the University management and the students. Whilst a further 32% believed that it was the management's responsibility to conserve energy at UKZN.

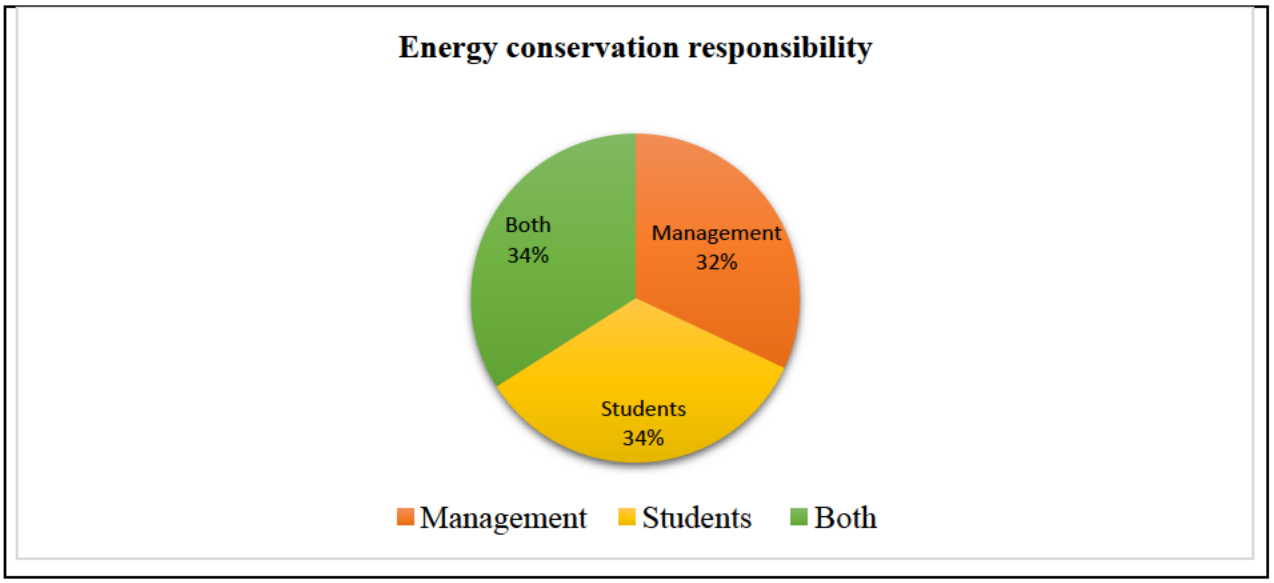

Figure 5.3 Responsibility to conserve energy

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

The assessment of responsibilities towards energy conservation was important in assessing the extent to which students demonstrate EC values. Ideally responsibilities are often attached to obligations. In their study on energy use, Meerah et al (2010:5716) argue that "the current environmental crisis can only be mitigated if ordinary individuals are to assume responsibility roles as the planet custodian". In emphasizing the importance of students and staff participation in

building a low carbon campus, Jiang et al (2013) illustrated how the role of people's engagement was crucial to sustainable campuses. This is in line with EC theory, which states that self-obligations, responsibilities and commitments are key aspects in efforts to conserve energy in a campus environment. However, data from the questionnaires indicates that there is no clear indication in terms of energy-saving obligations such that the responsibility to conserve energy tends to be perceived to shift between students and management. The explanations students gave to explain their responses were illuminating. Students' explanations enabled the researcher to note their attitudes as far as conserving energy at UKZN was concerned. The 34% that stated that students are responsible for the conservation of energy argued that students were the end-users and were the ones that had direct access to power points in their residences. The 32% that placed the responsibility on management contended that students were paying high tuition fees so management should be responsible for regulating energy consumption. The other 34% that noted that both students and management should be responsible argued that all parties used energy hence both should conserve it.

Results from in-depth interviews with management and RAs also reflected the same pattern whereby there was no clear answer as to who was responsible in conserving energy within the University residences. The management placed the responsibility of conserving energy on the student leadership bodies and RAs.

> *I think it is entirely up to the house committee and the RAs to set an example for the students. If they set a bad example the students will follow that. The house committee should be more vigilant and aware of issues around energy conservation. They are the ones staying there with the students so it's their responsibility to save energy (Jojo, November 10, 2015).*

On the other hand, some RAs believed that the management was responsible for ensuring energy conservation by introducing energy saving initiatives.

> *I think the Assets & Building officers are the ones responsible for conserving electricity because they are in a position to formulate strategies to conserve energy (RA5, October 29, 2015).*

Likewise, other RAs felt that energy conservation was everyone's responsibility but placed more emphasis on students' role in that regard.

> *I think everyone; it is not a responsibility of a particular individual. It has to come from within us as students, it is our responsibility and these residences are our homes away from home and if we were to run out of electricity it will affect us. Actually no lecturers are staying in the residences but us students. The university doesn't really care they will just raise fees if energy consumption is high. We need to take an initiative. The university does not have that power to stop students in residences because there are not always there in our residences (RA2, October 31, 2015).*

Other interviewees highlighted that the responsibility to conserve energy within the University residences was upon students themselves as stipulated in the residence rule book

> *Students should be responsible. It is their responsibility to unplug un-used appliances in their rooms that's the least they can do. They should not own appliances that use a lot of energy like stoves. There are notices and a residence rule book to guide students on what to own and how to behave in residences (RA3, October 30, 2015).*

Responses from the study showed that most of the participants placed students at the core of energy conservation initiatives because students have direct control over energy usage. This echoes Jiang et al's (2013) proposition that it is difficult to build low-carbon campuses without students' input. In their case study of the University of Michigan's energy program, Marans and Edelstein (2010) reveal that the energy program experienced many challenges because a significant number of students were not actively participating in the program. Horhota et al (2014:344) agree with Marans and Edelstein (2010) arguing that "a major component of any campus carbon reduction plan must focus on campus community members and encourage them to take sustainable practical actions".

When it comes to taking practical actions towards energy saving, the results from this study align well with Jiang et al (2013:615) assessment that "in reality most people assume themselves to take environmental friendly actions after others have done so". This is the same trend shown in the study, whereby management and students at UKZN tend to pass responsibilities on to each other.

Hence, there is no clear commitment by both parties pertaining to energy saving initiatives and as a result the University is faced with an ever-increasing electricity bill. For instance, an energy audit conducted in 2005 showed that UKZN spent about R8 million on electricity expenditure (Govender, 2005). In 2013, UKZN was paying an alarming R100 million per annual to cater for 90GWh of electricity used by the University (Knox, 2013.)

The ever-increasing energy utility costs at UKZN confirms Jiang et al's (2013) assertion that it is difficult to save energy when students and staff members are not fully involved in the process. Fudan University's low carbon campus project started to have a major impact after students and management made commitments to cut individual carbon emissions. Therefore, a positive attitude towards energy saving programs is vital in building low carbon campuses. This fits within EC theory that stresses the importance of commitments by individual to do justice to the environment. According to Dobson (2003) pro-environmental attitudes are an essential aim of the EC theory. For Farmer (2007), the ultimate goal of EC is to produce an environmentally responsible individual whose attitude will help curb environmental problems. In support, Meerah et al (2010:5715) state that "the concept of EC reiterates the fact that environmental conservation is everyone's sole responsibility". Therefore, the responsibility to conserve energy is upon every energy user whereby students and management play a complementary role. For instance, the University of Memphis was able to save $75 000 in utility costs and 5 million kilowatts of electricity after introducing a number of energy saving measures that were highly supported by the students (Hellums, 2008). However, achieving such energy saving milestones at UKZN can be a challenge considering that responsibilities to conserve energy tend to be shifted between management and students.

5.3.2 Students' willingness to participate in greening initiatives

In line with EC theory, DeWaters and Powers (2011:1699) contend that "the current energy path can no longer be determined by politicians and professionals but by every individual especially students". Hence, it was important to determine the degree of students' willingness to participate in pro-environmental activities as advocated by Dewaters and Powers (2011). For Dahle and Neumayer (2001) the major barrier to any campus-greening project is the lack of environmental concern and interest amongst students. Students' environmental interest and willingness to participate are key aspects in the effort to reduce energy usage. Table 5.3 below shows the

percentage of students' willingness to participate in energy saving initiatives by their study levels. Table 5.3 shows that most students, in the study, 78% stated that they would participate in energy saving initiatives, whilst 12% indicated that they might participate and the remaining 10% were neutral.

Table 5.3: Propensity to participate in energy conservation initiatives by level of study

Participation status	**Level of study** (Percentage)		**Total** (Percentage)
	Undergraduate	Postgraduate	
Yes	75	88	78
Maybe	17	0	12
Neutral	8	12	10
No	0	0	0
Total	**100**	**100**	**100**

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

Table 5.3 shows that postgraduate students were more likely to participate in energy conservation projects than undergraduate students. This projected postgraduate students as being more willing and more responsible towards conserving energy than undergraduate students. This emerging information from the survey was also confirmed by the information gathered from the in-depth interviews.

> *The behaviour is very different. Undergraduates don't care, they just love doing things to please other students so they would play their music out-loud for instance and leave their appliances unattended. A postgraduate cannot do that, they are usually on point because they are responsible and matured students (RA3, October 30, 2015).*

The majority of the RAs in the study perceived postgraduate students as being mature and responsible students. In support of this assertion, Table 5.4 below shows that postgraduate students were more likely to switch off their un-used appliances than undergraduate students were.

Table 5.4: Percentages for students' propensity to switch off appliances when not in use by level of study

	Undergraduate	**Postgraduate**	**Total students' percentage on switching off un-used appliances**
Always	32%	26%	**34%**
Sometimes	36%	67%	**48%**
Rarely	29%	7.%	**16%**
Never	3%	0.%	**2%**
Total	**100**	**100**	**100**

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

The projection of postgraduate students as being more pro-environmental than the undergraduate students was also evident in the case study conducted at the University of Michigan. After analyzing the energy conservation initiative at the University of Michigan, Marans and Edelstein (2010) affirmed that graduate students were more knowledgeable and committed than undergraduates towards 'greening campus' projects. A comparison study in Colorado that showed disparities in energy consumption between two public institutions also highlighted the fact that senior students are more responsible than junior students (Schelly et al, 2011). This trend is also visible at UKZN because postgraduates are mostly mature students with exposure to a number of life-orientation programs over their academic years that shape their well-being and conduct.

5.3.3 Motives for students' participation

The previous section showed that the majority of students, 78% in the study, were willing to participate in energy conservation initiatives. The researcher then probed to investigate the factors that propelled students to be more willing to take part in the greening initiatives. The idea was to determine whether the students' drive to conserve energy is consistent with the EC ideology of preserving the natural environment. To this end, Figure 5.4 below shows students' explanations regarding their willingness to participate in the greening initiatives. As shown in Figure 5.4 the dominant motive for students, 64% was for them to pay less for their tuition fees. The other 22% indicated that they would participate in greening activities in order to conserve energy while 10% believed that participation in greening activities would develop their green attitudes. Lastly, only 4% of students in the study stated that they were not interested in any greening campaign.

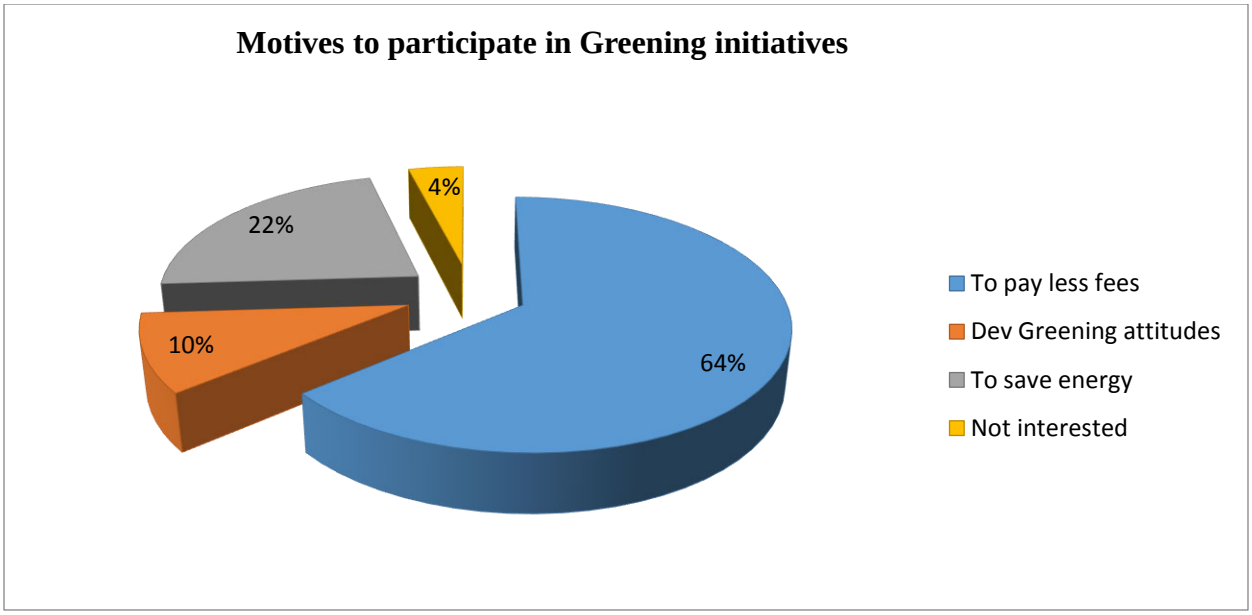

Figure 5.4 Students' motives to participate in greening initiatives

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

The results from the survey showed that students were prepared to participate in greening initiatives, given that there will be tangible benefits such as a reduction in their fees and energy usage. Likewise, students at Tufts University "overwhelmingly indicated that they would be most likely to actively reduce their electricity use if they were to receive incentives for saving energy" (Marcell et al, 2004:182). The emerging data from the study highlighted a strong desire by students to pay less for their fees, projecting that students perceived tertiary fees at UKZN as high. Schelly et al (2011:316) echoed the same sentiment by arguing that "the rising energy costs coupled with the shrinking universities' budgets can be easily reduced through conservation efforts by students and staff members". However, the majority of the students in the study, were of the view that energy conservation practices should have a direct positive impact on their university fees.

> *Residential fees are quite high and if it means that we have to conserve energy in order for us to get a reduction in the res fees, it won't be much of a problem to act likewise (Student 33, September 9, 2015).*

> *I save as much electricity as I can, if there is more I can do for me to get a reduction (fees) I will do it (Student 44, September 13, 2015).*

I would do anything to reduce my fees even if it means saving the university electricity consumption (Student 42, September 11, 2015).

Other students argued that they would participate in energy saving programs because programs of such a nature carry a ripple effect. Thus, by saving energy in their residences they can reduce their tuition fees while also curbing environmental degradation.

It would be a win-win situation, as I get to reduce my own fees and at the same time contributing to the lessening of the environmental crisis particularly the current energy crisis (Student 46, September 16, 2015).

At this moment, South Africa is experiencing both water and energy crisis that is why we have load shedding and drought in KZN. Conservation programs would encourage students to save electricity especially through switching off their un-used appliances (Student 36, September 9, 2015).

The responses from the students showed that they were mostly likely to save energy if their efforts translated into a reduction in their tuition fees. A similar study at Coventry University in the UK also found that students were highly motivated to reduce their energy consumption if such efforts were financially incentivized (Broughan and Hartless, 2011). Surprisingly, a study also conducted at UKZN with staff members showed the direct opposite results. According to Singh (2010) 91.6% of the staff was motivated to conserve energy in order to preserve the environment for future generations, whilst only 8.4% mentioned the reduction of utility costs. Halloran et al (2015) best explained this discrepancy between the students and staff members at UKZN regarding the factors that motivate them to save energy. According to Halloran et al (2015), people in households are likely to conserve energy in order to reap the financial benefits that come with low energy consumption. They further show that with non-resident individuals such as "workers in industrial or commercial sectors the environment impacts are more likely to be cited than financial savings as a reason to save energy" (Halloran et al, 2015:2). The reason behind is that in non-residential building or workplaces, employers are responsible for the costs arising from the energy consumed by employees. Whilst in the domestic sector, residents bear the costs of their households' energy consumption hence their motivation to conserve energy is mostly financial (Halloran et al, 2015). This is why the motivation behind energy conservation at UKZN differed between the students

and the staff members because the University settles the electricity bills and this does not impact directly on the staff. Notably, most of the university's funds came from the students through the payment of their tuition fees hence students are at the receiving end and are highly motivated by saving money, particularly in light of the 'Fees-Must-Fall' campaign. The University's utility costs impact directly on students and the on-going Fees-Must-Fall protests are an indication of how students are at the receiving-end of any rise in tuition fees.

For Kahler (2003) saving money through conserving energy consumption is just a short-term benefit. He argues that prominence should be placed on mitigating the contemporary environmental crisis. This prompted Kahler (2003:234) to condemn the media for "placing more emphasis on the money savings effect of conserving energy, such that the students fail to see the long-term environmental benefits of saving energy". Similarly, students at UKZN cited the lack of monetary benefits attached to saving energy in their residences. Brewer et al (2011) argued that students pay a flat accommodation fee hence any reduction in electricity usage by students will not directly translate into a monetary benefit since they would have settled their fees already. Parece et al (2013:746) state that "the key issue within universities is how to promote environmentally pro-attitude among students who have access to appliances but have no direct financial incentives if they are to conserve energy". To this end, the study sought to inquire from students if conserving energy within their residences would result in fees reduction. Figure 5.5 below shows students' responses regarding the correlation between energy conserving habits and fees reduction.

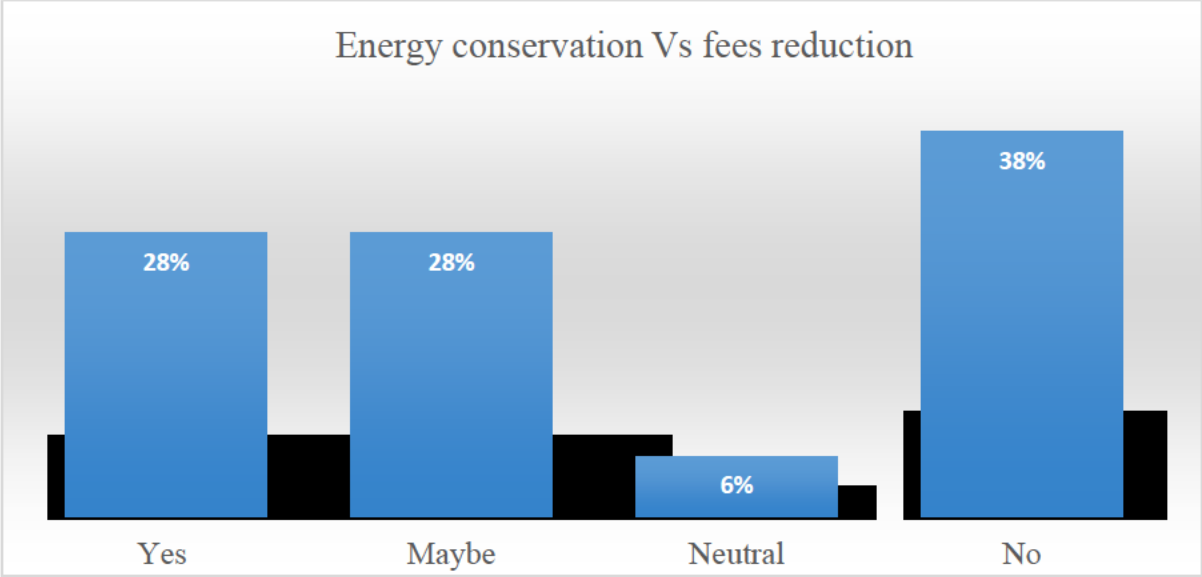

Figure 5.5 Does conserving energy reduce fees

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

Figure 5.5 highlights that 28% of students felt that conserving energy in residence would reduce fees and similarly another 28% stated that energy conservation efforts might curb the escalating residential fees. Notably, 6% of the participants were neutral whilst the majority, 38% believed that conserving energy would never reduce the ever-increasing fees. The quotes below are typical of students who argued that energy saving would not reduce residential fees.

> *The University officials are capitalists who are only concerned by making maximum profits so even if I save energy it will not affect the residential fees (Student 30, September 9, 2015).*

> *The university is a business so fees will never be reduced they can only increase regardless of whether students save energy or not (Student 42, September 11, 2015).*

In contrast, data from the in-depth interviews with university officials showed that officials were certain that energy saving initiatives would consequently reduce students' fees.

> *I think the first benefit of conserving energy would be reduced fees because I think fees keep increasing because of students are abusing resources. For example, if the electricity consumption rate is high obviously the electricity bill will be high, the university comes back and charge students more in order to cover bills. If the*

residential bills of water and electricity are lowered, I do not think the management will have anything that would motivate them to increase the fees (RA5, October 29, 2015).

Nevertheless, the majority of students in the study felt that altering their energy consumption patterns would not result in fees reduction. A similar study conducted amongst university dormitories by Kahler (2003) also reflected the same results whereby students hinted that university fees would increase in spite of them saving energy. For instance in his study, "a student said she could not see the value in saving energy when the university was about to significantly raise her tuition costs" (Kahler, 2003:234). It is therefore clear that the surging tuition fees tend to influence and shape students' attitudes towards energy consumption within the university residences. Thus, students appeared to legitimize the over-consumption of energy because they argued that they would have paid for it already. This emerged from the interviews with RAs and the university officials who argued that most of the students felt that they were entitled to use electricity as they wish since they were paying a lot for fees.

The attitude that they (students) have is that they have in fact paid for it (electricity) which is why they do not obey or listen to you when you voice out your concern about energy wastage, they simply tell you that they have paid for it. They even tell you how much they paid (fees) and argue that the amount they are paying is worth them abusing electricity (RA5, October 29, 2015).

I do not know if I can put it as a 'I do not care' or more of 'I pay for it' kind of attitude towards energy consumption. I think within the residences the mentality is that your electricity bill has already being paid for so you do whatever, whenever you want to. You can leave your lights on because you feel the bill has already been paid for. I think that's one of the things that undermine the efforts to conserve energy. Students miss the big picture, that it is not just about settling the electricity bill but it's about conserving the environment (Pipi, October 26, 2015).

Generally, electricity in the residences is something that students think will never run out. It is something that students do not think much about, they can leave their lights on and it does not matter. For them (students) it does not matter if the machines are

kept running for countless hours, it does not matter because they argue that they have paid for it. Therefore, the attitude is somewhat indifferent (RA1, November 1, 2015).

The research findings illustrate that the payment of fees in the academic arena plays a critical role in moulding students' attitudes towards energy use. On the other hand, universities justify fee increments to students with the ever-rising utility bills but students argued that fees increase annually even if they are to save energy. Another important aspect in this regard is the unavailability of monthly bills to students meaning that students are completely ignorant of their energy use. Students' inaccessibility to energy bills can dampen their efforts to save energy because they will not be aware of their conservation effort as far as energy usage will be concerned. This is the reason why EC theory calls for environmental awareness building amongst individual so that people acknowledge the natural environment as the most immediate valuable outcome of conserving energy.

For Kahler (2003) there is greater need to educate students about the link that flows between their personal attitudes and contemporary climate change. In support, Cotton et al (2015) re-affirmed the EC tenets of encouraging students to make informed environmental-related choices in order to curb environment degradation. More so, Sutton and Gyuris (2015:16) reinforced this point by arguing that, "the role of universities should be aimed at preparing students with environmental awareness knowledge in order to help address critical global environmental challenges". This is in line with the EC theory because it calls for individuals to embrace 'green attitudes' to enable them to take custodianship of the environment. Therefore, there is a need to create a conservation culture within universities so that students understand the importance of engaging themselves in pro-environmental behaviour. The main motive to conserve energy in residences should be to lessen the contemporary energy crisis not solely to obtain monetary benefits. However, this notion can only materialize if students are well equipped with environmental knowledge. This argument was supported by Marcell et al (2004) who contended that the primary impediment to 'green campuses' initiatives was the lack of environmental knowledge amongst students. This motivated the researcher to make an inquiry into the levels of awareness of students towards environmental issues at UKZN.

5.4 Environmental education and awareness

Environmental education is a critical component of EC because it equips citizens with the necessary environmental knowledge that will motivate them to become pro-environmental individuals. DeWaters and Powers (2011) described a pro-environmental individual as someone who clearly understands how his or her individual actions can negatively impact on the environment. According to Levy and Marans (2012), environmental awareness can positively influence individuals to undertake environmentally responsible actions to avoid environmental catastrophe. Bittle et al (2009) cited in DeWaters and Powers (2011) assert that the lack of environmental knowledge could be the greatest challenge facing communities in the alleviation of energy-related issues. DeWaters and Powers (2011) telephonic study referred to in Chapter 2 reveals the low energy knowledge of individuals. EC theory then argues that efforts to address environmental issues around communities will have to start by making people understand how their energy consumption patterns contribute to the environmental degradation (Brewer et al, 2011). Hence, efforts to curb the energy crisis require individuals to embrace and understand energy literacy as this will foster pro-environmental behaviour. Energy literacy is paramount because through it, people become aware of specific actions they can undertake to cut-down on their energy usage. In spite of the importance of energy literacy, a significant number of research papers have shown that energy related knowledge is disparagingly low amongst individuals (DeWaters and Powers, 2011). It is to this extent that the study sought to look into the students' knowledge of environmental issues and the energy crisis.

The inquiry into students' environmental awareness was framed around questions that wanted to understand students' sources of knowledge about environmental issues. Students were also asked about their knowledge and participation of environmental-related programs implemented within the University residence. Afterwards, students were asked to rate UKZN's commitment to the ideas of low carbon citizenship. Lastly, students and University officials in the study were asked to document the effects of the energy crisis on them, particularly in relation to load shedding at UKZN.

Participants in the study showed a good general understanding of environmentally related issues and they were able to cite different issues as illustrated below.

The destruction of the environment through cutting down of trees, air pollution which I think is the most common now judging by the number of factories, industries and the cars that are producing carbon dioxide thereby destructing the environment. Then there is also noise pollution in areas that are actually next to these industries or companies that make noise during the production process (RA2, October 31, 2015).

As it stands in South Africa we have a drought problem so before we know it, we will be running out of water so it is very important as residents, university and the country at large to try to save water (RA5, October 29, 2015).

I am aware of the depletion of wetlands as a result of climate change and also as a result of man-made impact. The other one is air pollution because of the numerous industries and environmental degradation is occurring due to the greenhouse emissions (RA4, October 28, 2015).

I would actually tend to put my emphasis on water right now than electricity. They are parts of our country that go the entire day without water and this has been going on for months. I have staff who can actually attest to that they come in the morning knowing there was no water and go back to find out that there is still no water, and water is only allowed for one hour during the day. We are lucky we still getting water and we not facing the restrictions. If that were to happen we will be in serious trouble forget the electricity we will not have water. With electricity, major crisis is management by the government with Eskom being the driving force behind, I think money was not spent properly in some area but the end user that is the consumer is the one who suffers. Now it means we are going to be adding more to harming the atmosphere because our reaction to having power outages is to put generators on and now we emitting all kinds of gases into the atmosphere (Hassan, October 28, 2015).

This emerging data proved that participants were knowledgeable and could link certain human actions to environmental degradation, such as deforestation and air pollution. The response given by the University official echoes the findings in the previous section whereby University staff showed a greater concern toward environmental issues and that was their main motive to save energy at UKZN. Hence, environmental awareness particularly amongst the University officials

was high. However, it was equally important to explore the sources of environmental knowledge in determining key contributing environmental awareness avenues.

> *It is one of the issues that I grew up being taught in school and as times goes on and you start to see things tangibly then begin to understand them as you look around you and see. So when I started learning them in primary school, it was just a way of learning. I could not apply what they meant, you just had to know but as you grew, it became knowledge you could relate to and could explain. You would see something and say "yeah! This is what is happening". You realise when you are contributing to water pollution or air pollution and know that this will lead to global warming if you continue doing it (RA1, November 1, 2015).*

> *I think it is based on the module we did when I was doing my undergrad. Doctor Noel is the one that raised my consciousness in Sociology. One of the articles we did titled Energy Poverty that spoke about how the destruction of the environment can lead to poverty. Also following the proceedings of COP17 showed me how pollution has become a major global concern (RA2, October 31, 2015).*

> *I became aware of environmental issues through watching the news and reading newspapers. You find stories on how farmers are suffering along with the animals because they do not have enough water so as a person who conserves nature, it worries me because I love nature so much. We have to do everything to protect it (Buddie, November 10, 2015).*

> *I remember in my primary/high school we had a competition that was based on how to save water and electricity. Each school had to come up with a play, song or whatever else saying or showing ways of conserving water and electricity. Even now, 10 years later I still remember that song and know what it means (RA5, October 29, 2015).*

The sources of environmental knowledge by the participants align with the sources that were documented in a case study on students' energy literacy. According to Cotton et al (2015:457), "sources contributing to participants understanding of energy or environmental issues included

interest, television and nearly 70% cited formal education". The findings from this study also showed that media played an important role in raising environmental awareness but the most cited source was also formal education received in schools. Therefore, environmental education plays an important role in the alleviation of the environmental crisis. This reflects the main tenants of EC theory whereby the "theory calls for the establishment of a strong link between citizenship and environmental global issues" (Wolf et al, 2009:506).

Formal education has that ability to link individuals with environmental issues as highlighted by the study findings. Learning institutions play an important role in stimulating environmental interest amongst students. Evidence from a study of green campus activities by Levy and Marans (2012) notes that environmental education motivates students to be responsible towards their energy consumption. There is a growing realization that environmental education is crucial in any campus-based initiative that seeks to reduce its carbon footprint. As discussed in Chapter 2, many tertiary institutions in the USA require students to complete environmental education courses before they graduate (Levy and Marans, 2012). Nevertheless, this approach has not emerged as yet in most of the South African Universities as argued by Maistry (2012) in his study at the University of Johannesburg (UJ). Maistry (2012) indicate that most of the universities in South Africa are not investing much funds and efforts into campus 'green-activities'. Likewise, UKZN is still to embrace the notion of environmental education and this prompted Govender (2005) to argue that if meaningful energy usage reductions at UKZN are to be attained, energy literacy has to be considered. Participants in the study also expressed a great desire for the introduction of environmental education at UKZN as shown below:

> *I think it is a brilliant idea (environmental education) because it then gives every individual a sense of responsibility in saving electricity because that obviously needs to be taught, it does not come within you and if that module is the tool to be used to conserve energy so yeah I will definitely say yes (Hassan, October 28, 2015).*

> *Environmental education could be a brilliant idea, considering the fact that times are changing and environmental issues have now become everyone's concern. If we do not value our environment and its issues, we will have environmental challenges everywhere we go because these issues are everywhere. To have a core subject about*

the environment for students will be beneficial to communities, companies and the world at large because they can spread the message even after university. It should not be just for Geography and Environmental students, other departments should have it too. Climate change is not affecting Geography and Environmental students only but everyone. The bad thing is that some of those affected by the environmental issues they do not know anything about the environment-education, nothing at all. So at the end of the day every student should know about the environmental issues regardless of their faculty be it law, engineering, humanities, nursing so that they are able to share (RA1, November 1, 2015).

In everything that we do now we need to protect the environment so if you do not know the consequences of not protecting the environment, you tend to be negligent. For example, nowadays you cannot build a house in an area without knowing the environmental impact of that building. In fact, you cannot do anything without knowing the surroundings of that area, whether there are rivers etc. I think it is important that the university introduces such a policy, whereby environmental education or management is introduced in every faculty and college (RA3, October 30, 2015).

The data gathered from the study highlighted Maistry's (2012) criticism of African universities' commitment towards campus based energy reduction initiatives because it is clear that UKZN is still to embrace the idea of environmental education. The participants acknowledged the importance of environmental education and appealed to management to consider its introduction at UKZN. Maistry (2012) argues that universities should spearhead greening initiatives through training and learning but there is a clear distinction between international universities and the local African universities. In spite of both international and local universities being signatories to the 1990 Talloires Declaration, international universities have implemented a number of measures to curb their carbon foot-print whilst the latter is lagging behind (Maistry, 2012). Letete et al (2011) also highlighted the importance of stimulating environmental education within African institutions after conducting a study on electricity consumption at the University of Cape Town (UCT) where the energy consumption rate was high. Prior to this study, there have been two significant energy consumption studies conducted at UKZN by Govender (2005) and Singh (2010). Both studies had

indicated the need for environmental education at UKZN in order to foster participative greening attitude and behaviour amongst students. However, data from this study showed that UKZN is yet to commit itself to environmental education despite the fact that it is a signatory to the Talloires Declaration and it has an environmental policy. The 14 principles stated within the UKZN environmental policy clearly stipulates that the University will seek to create an environmentally conservative culture, through the provision of education that promotes environmental awareness (UKZN, 2015c).

5.4.1 UKZN's commitment to low carbon principles

It is important to note that through its environmental policy, UKZN acknowledges its role in implementing pro-environmental measures and reducing its campus carbon footprint. The environmental policy highlights that UKZN commits itself to take responsible steps in reducing water and energy wastage in all its campuses (UKZN, 2015c). The study sought to measure UKZN's commitment towards reducing energy consumption, hence students were asked whether UKZN was committed in that regard. Figure 5.6 below is an illustration of the students' responses. Figure 5.6 shows that only 4% of the students in the study strongly agreed that UKZN was committed to energy conservation, whilst 28% agreed, 22% were neutral and the majority of the students, 38% disagreed. Lastly, 8% of the students strongly disagreed that UKZN was committed to energy conservation.

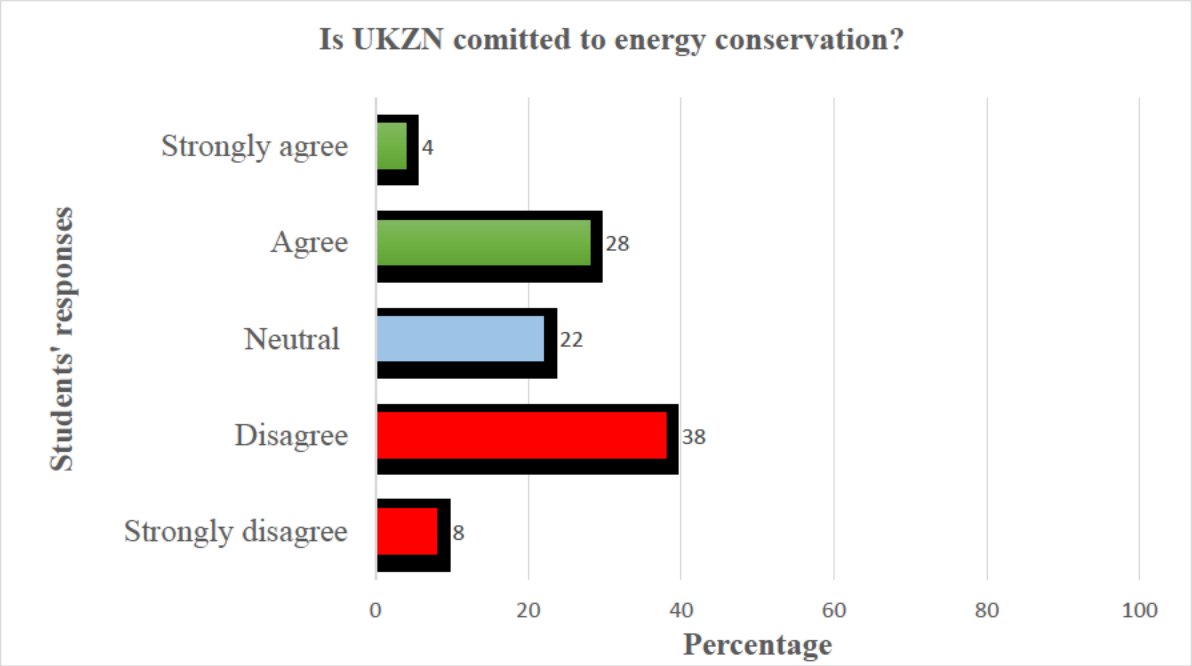

Figure 5.6 UKZN's commitment to energy conservation

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

The results show that there is a discrepancy between the environmental values and obligations enshrined within the UKZN Environmental Policy and the manner in which the University engages itself. The majority of the students did not regard UKZN as being committed to initiatives directed towards curbing energy usage within the university. To widen the scope pertaining to UKZN's commitment to the reduction of its carbon footprint, students were also asked to rate some of the pro-environmental programmes or initiatives that were implemented within the university. Table 5.5 below shows students' rating of the University's efforts to reduce energy consumption.

Table 5.5: Rating of UKZN residence initiatives towards energy conservation

Rating of energy conservation initiatives at UKZN	**Total (percentage)**
Poor	42%
Fair	28%
Good	24%
Excellent	6%
Outstanding	0%
Total	**100%**

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

Table 5.5 reflects the results illustrated in Figure 5.6 that portrays a negative and contrasting 'imaginary' between the University's environmental obligations and its actual environmental approach. As shown in Table 5.5, nearly half of the participants rated UKZN as being poor as far as the implementation of energy conservation measures were concerned. A further 28% rated the University approach as being fair, whilst 24% rated them as being good. Only 6% of the participants rated the University's approaches to energy reduction as being excellent and none regarded them as being outstanding. The majority of the students rated UKZN's approach to energy conservation as being poor as shown below:

> *Energy usage is very high and not even controlled, students use it (energy) anyhow. There are not even posters to encourage students to conserve electricity in the residences or on campus (Student 15, September 7, 2015).*

> *The University does not have any awareness programmes or informative messages to students on saving energy (Student 30, September 9, 2015).*

> *The lights in the library are always on as well as in other places even at night. Lights are always unnecessary turned on during the day even in the residences (Student 44, September 11, 2015).*

A study by Singh (2010) with staff members at UKZN also identified the same pattern and feelings of her participants towards UKZN's commitment to pro-environmental approaches. According to Singh (2010), 33% of the participants indicated that they were not contributing to greening efforts at UKZN because the University did not have any greening procedures or initiatives that provided guidance. Students in this study raised the same argument. They contend that there is a lack of assistance and stewardship by the University in spearheading a conservation culture at UKZN. To this end, the in-depth interviews with the DSRA officials inquired whether the department had on-going programs within residences aimed at promoting energy saving behaviour amongst students. The aim was to validate the data obtained from the energy surveys. Below are the some of the quotes on the implementation of energy conservation programs.

> *I do not think we focus much on electricity use as RAs because in most cases when we implement residence programmes, we do what has already been done and try to*

reiterate that. So as RAs we are not really innovative in terms of coming up with new ideas. We have not done something like that to be honest (referring to energy saving initiatives) but I think it might be an important initiative because when you start raising consciousness of students that might be important in educating them about the environmental issues (RA2, October 31, 2015).

Honestly I have not had any official project for reducing the use of energy but what I did was putting up posters in the kitchen and bathroom, informing students on good energy saving practices such as switching off the stoves and microwaves after usage. However apart from these posters, the department does not have any program specifically aimed at encouraging students to save energy in our residence (RA5, October 29, 2015).

Other than having those meetings or campaigns that are aimed at advising students on how to use energy better and save it especially since South Africa is having load shedding. There are no other programs initiated by residence department. As a RA you can just go door to door advising the students to save energy in their rooms (RA3, October 30, 2015).

The DSRA manager was also asked to explain the department's position regarding the progress of the greening campus initiative within the residences. The manager elaborated on the department's programmes which are offered to students to encourage a conservation culture in the residences.

Initially when students occupy the premises we give them a welcome brochure, in this brochure there are tips and guidelines outlined on energy saving procedures and we have orientation programmes as well. As a department, we do speak to the RLOs (Residence Life Officers) and RAs that they need to put notices and inform students to switch off their appliances when there are not in use (Jojo, November 10, 2015).

This position was also supported by various RAs who confirmed that even though the department did not have energy saving programmes to encourage conservation, they are often encouraged by the department to support students to conserve energy.

It is not like there is a programme per say but it is something that we are always encouraged by the department to tell our students to turn-off un-used electrical appliances. Also to ensure students follow certain rules such as turning of their radios at the stipulated times and switch off their lights when they are sleeping so that energy is not wasted. The department asks us to at least encourage our students to use energy sparingly to avoid wastage; it is not a programme as such (RA1, November 1, 2015).

Few months ago, at the housing department there was a notice that stated that 'after you have used the stove, make sure that you switch off the electricity'. I think they (DSRA officials) are seeing the need of trying to raise consciousness amongst students towards issues of conserving energy. However, I am not sure if there will be a proper programme for students but it was something that I saw at the offices (RA2, October 31, 2015).

The housing manager was present in our first residence meeting and he said that they (DSRA) will try to install a meter-box to see how much energy each residence uses. The idea was to encourage students to save energy, as they would know how much their residence would be using compared to others. As it stands, nothing of that sort has been done so it is not easy to see whether students are saving energy or not (RA5, October 29, 2015).

It is clear that DSRA acknowledges the desire to motivate students to conserve energy in their residences. However, less attention has been given to the implementation of greening initiatives within UKZN residences. Thus, energy-posters alone will not be an effective tool in encouraging students to save electricity. Not much support is given to the RAs by the department in terms of embarking on pro-environmental projects or programmes. Hence, the findings of this study contradict the environmental policy's principles of UKZN. For instance, principle 5 stipulates that UKZN will acknowledge, encourage and support student body's creativeness towards energy conservation initiatives (UKZN, 2015c). However, the support highlighted within the environmental policy does not translate into action, as demonstrated by the participants of this study. The university officials still need to show a greater commitment as far as the creation of a conservation culture at UKZN is concerned. The same criticism was raised in an energy study

conducted at Rhodes University. Rickerts et al (2007:12) highlights that "Rhodes University environmental policy on electricity does not include specific details nor does it provide guidance on how electricity should be used efficiently at the institution". Therefore, environmental policies in most local universities tend to be very eloquent in stating the possible strategies that can be adopted to curb energy use, but they do not outline how such strategies could be implemented. This reinforces Maistry's (2012) assertion that most African universities do not show the same enthusiasm of spearheading the greening campus initiative as their European counterparts.

Most American and European universities are quick to adopt and commit themselves to environmental initiatives. For instance, over 600 universities in the USA are signatory to the 2006 President's Climate Commitment initiative that calls for the member-universities to implement green projects (Marans and Edelstein, 2010). European universities are also vocal and hands-on when it comes to the introduction of environmental education. At Ball State University, greening initiatives are incorporated into the university's strategic plan such that there was a well-established inclusive council to address environmental matters (Koester et al, 2006). This level of commitment towards curbing environmental issues is not yet visible within the local universities. For example, out of the 440 universities that are signatories to the Talloires Declaration, South Africa has only five universities, while the majority are European institutions (ULSF, 2015). This justifies the call by Kofi Annan, then United Nations' secretary general, for African universities to be forerunners of good environmental governance in the continent (Maistry, 2012).

However, South African universities could be lagging behind in playing this pivotal role of promoting environmental strategies because they are faced with pressing issues of 'shrinking' operational budgets. The years 2015/2016 are characterised by national-wide students' protests against university fee increments as much attention was devoted to addressing the protests. The problem of the 'shrinking' operational budget has been attributed to a range of factors including the ever-escalating universities' utility costs. A significant 20% or more of the total utility costs that local universities are facing is solely the electricity bill (Govender, 2005). This assertion reinforces the importance of greening initiatives within universities because such initiatives have the ability to curb increasing utility costs. Universities should be hubs for low carbon projects to encourage students to be better environmental citizens. However, data obtained from this study

showed that UKZN is perceived to be less committed in preparing and mentoring its students to become low carbon citizens.

5.5 Energy consumption patterns

Energy consumption patterns emanate from the trends relating to the usage and operation of electrical appliances by individuals. The underling aspects regarding energy consumption patterns are the individuals' behaviours and practices. Hence, if one is to analyze the energy consumption patterns through the EC 'lens' it is crucial to fully consider the individuals' behaviour and actions towards energy consumption. According to Wolf et al (2009:518) "ecological citizenship is characterized by the actions individuals undertake not only as voters but importantly also as consumers or members of local communities". EC's approach is based on the alteration of an individual's behaviour so that he or she acts in an environmentally friendly manner (Dobson, 2003). This will make the individual assume an active role that is guided by obligations and duties to be performed in an effort to lessen the environmental and energy crisis. In support, Latta (2007) states that EC's aim is to inculcate citizens with a moral attitude and responsibility that will motivate them to preserve the natural environment around them.

EC theory is a framework employed in this study that depicts how students ought to behave in relation to the current prevailing energy crisis. EC is presented as an energy governance approach that targets students residing in university buildings to cut-down their energy consumption. This is so because the reduction of energy use in buildings is considered to be an important aspect in achieving carbon reduction commitments (Janda, 2011). Aronson (1984) cited in Janda (2011) argued that energy consumption in buildings should be viewed as a social problem rather than a technological one. This position was supported by Halloran et al (2015:1) who stated that "creating buildings which are more energy efficient is crucial to challenge global warming, but decarbonization also depends on how people use energy in those buildings". The main argument brought forward is that reduction of energy usage in buildings is not merely about altering the nature of buildings but most importantly it is about altering the occupant's behaviour. According to Janda (2011:17) "while approximately half of the energy used in the home depends on the characteristics of the house and its equipment, residents and their behaviour influence the rest". This goes to support the claim that 'buildings do not use energy but people do', hence the motive to analyze students' energy consumption patterns.

5.5.1 Electrical appliances within residences

In analyzing the students' energy consumption patterns, the study firstly documented the different electrical appliances in the university residences and the appliances that students have in their rooms. The patterns of energy consumption were drawn from students' practices and behaviour towards the usage of lights, plugs and electrical appliances. Another interesting aspect was the knowledge and adherence of students regarding energy usage regulations within the university residences. Lastly, the study asked the DSRA officials about the measures administered by the department to monitor and reduce energy consumption at UKZN.

In an effort to determine the energy consumption patterns in the UKZN residences by students, the study considered both electrical appliances in students' rooms and those placed in shared places such as kitchens and entertainment rooms. Figure 5.7 below shows the number of electrical appliances each student in the study owned in his or her room.

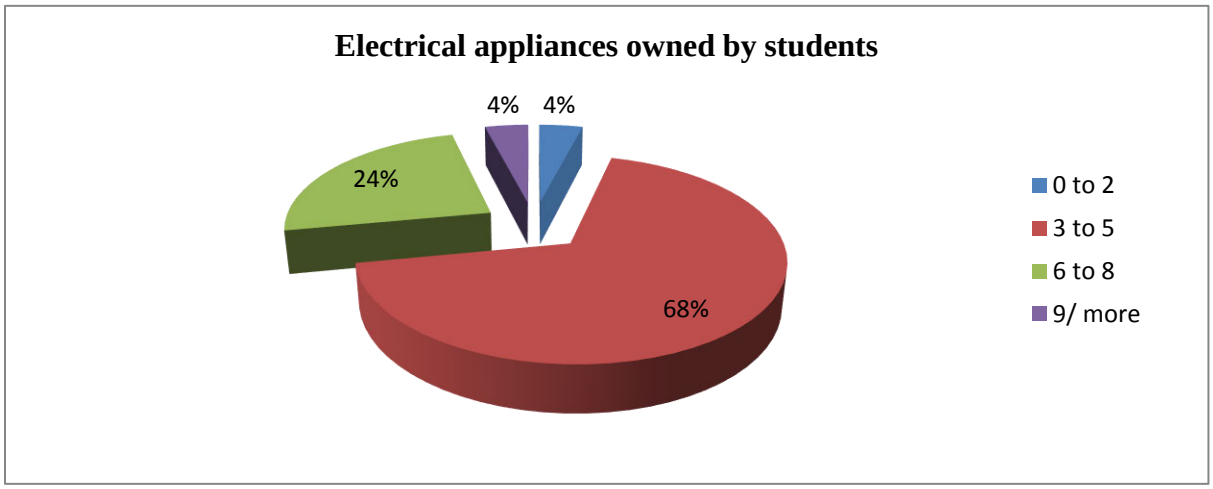

Figure 5.7 Number of electrical appliances in students' rooms

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

Figure 5.7 shows that the majority of the students in the study, 68%, had 3 to 5 electrical appliances that they used in their own rooms. Students with appliances ranging between 6 and 8 in their rooms made up 24% of the sample. Both students with two or less appliances and those with more than nine electrical appliances equally accounted for 4% each. This data showed that students staying within the university residences owned considerable numbers of appliances that had a significant

impact on the amount of energy consumed within each residence. One of the RAs in the study noted with concern, the number of appliances owned by students.

> *You know students love gathering together and with that you will find lots of different gadgets such as PSPs, big speakers, laptops and other gadgets. You would be surprised by some the appliances students have in their rooms and you would be wondering why they need all of these things in the residence because university and why are you waste electricity (RA1, November 1, 2015).*

Nevertheless, students' energy consumption patterns could only be determined by the type and usage rate of these electricity appliances. Figure 5.8 below shows all the electrical appliances listed by the students in this study.

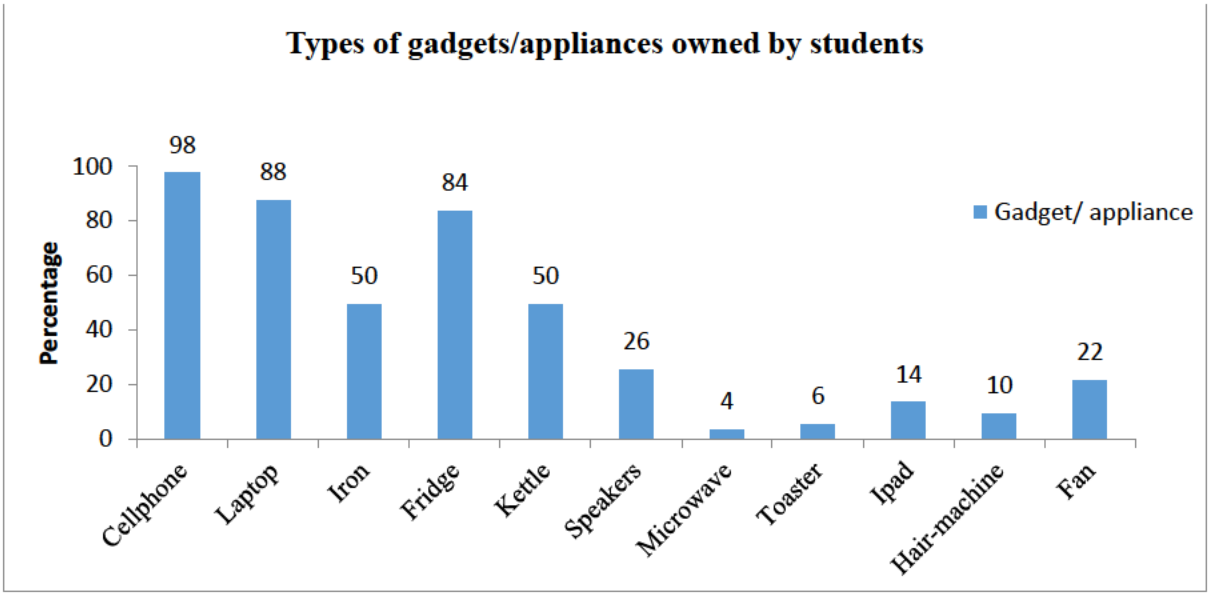

Figure 5.8 Gadgets/appliances in students' rooms

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

As shown in Figure 5.8 above, the most popular appliances or gadgets that students have in their rooms are cellphones (98%), laptops (88%) and fridges (84%), followed by irons (50%), kettle (50%) and speakers (26%). The least owned electrical appliances by students are fans (22%), iPads (14%), hair-machines (10%), toasters (6%) and microwaves (4%). Cellphones, laptops and fridges are the most frequently owned appliances by students residing in the residences. Whilst only a few students have toasters and microwaves mostly, because these appliances are not allowed in the residences by the management as discussed by one of the RAs.

As RAs sometimes we conduct the un-announced residence-checks and we always find out that students have numerous appliances in their rooms that range from double-door fridges, heaters and even microwaves that are not allowed in the students' rooms. Since these appliances consume a lot of energy in our residence (RA4, October 28, 2015).

Nevertheless, the monitoring of residential rules on appliances and energy usage will be discussed in the following section but the quote explains why few students owned toasters and microwaves. The study also wanted to investigate the duration in hours on a daily basis these different appliances are plugged in to electrical sockets. This was done in order to establish the energy usage pattern and to identify which appliances are plugged to electrical sockets more frequently than others. Table 5.6 below shows all the identified appliances and the duration they are used or plugged in, by both female and male students.

Table 5.6: Standard deviations, frequencies and mean daily time (in hours) for which an appliance is plugged in to an electricity, by gender.

Appliance	**Female**			**Male**			**Pooled Mean-hours** *(students in the study)*
	Mean	**Standard Deviation**	**N**	**Mean**	**Standard Deviation**	**N**	
Cellphone	6.13	6.40	23	7.05	6.18	26	6.22
Laptop	5.29	5.04	21	8.31	5.07	21	7.05
Iron	0.10	0.71	15	0.14	0.12	10	0.11
Fridge	24	0	19	24	0	23	24
Kettle	0.10	0.54	10	0.11	0.10	12	0.10
Speakers	8	0	1	5.5	3.21	12	6.09
Microwave	0.10	0	1	0.30	0	1	0.2
Toaster	0.10	0	1	0.30	0.32	2	0.23
iPad	8	9.11	5	4.50	1.11	2	7
Hair-machines	0.06	0.11	3	0.10	0.11	2	0.08
Fan	3.07	2.08	3	9.22	9.24	8	7.45

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

Note: Column percentage add to more than 100 percentage on response data on appliances because students reported ownership of more than one in all occasions.

The data shows that the majority of the students are mostly likely to charge or plug in their cell-phones and laptops for 6.22 hours and 7.05 hours per day respectively. The data also highlights that both male (7.05 hours) (8.31 hours) and female (6.13 hours) (5.29 hours) students alike are on

average more likely to use electricity on ICT devices. This data explains why the majority of the students in the study, 44%, were not satisfied with internet access (see Figure 5.1) as they use their laptops and computers extensively. Thus, students are more likely to use and charge their ICT devices namely cell-phones, laptops and iPads which access wireless internet connections. Challenges in connecting to the internet are mostly likely to have a negative impact on students' satisfaction. As shown in Table 5.6, room it is not surprise that fridges are connected to electricity points throughout the day and night in rooms belonging to both male and female students.

The least reported electrical appliance used by students accounting for about 8 minutes on average per day is the hairdo-machine. Interestingly, male students are almost twice as likely as female students to connect hairdo machines to electrical points on a daily basis. One of the male students reported that other students borrowed his hair-machine almost on a daily basis. This finding from the study supports the literature that South African males are culturally systematic hair clippers. According to Khumalo et al (2007), African men prefer to have a clean shave and their hair is commonly cut or clipped with electrical clippers. Therefore, the finding confirms the fact that African males are constantly cutting their hair albeit this practice has implications on the electricity consumption within the residences, although these appliances do not consume large amounts of electricity as shown by the time it takes to charge them each day. Electrical fans have a significant average timeframe of 7 hours and 45 minutes per day mostly because the study was conducted in summer hence students tend to use their fans frequently. However, as the data shows not many students use fans in their rooms. Table 5.6 is important in illustrating the duration in terms of hours on a daily basis that students used their gadgets or appliances whilst they are plugged-in to electrical sockets.

5.5.2 Energy usage within residences' shared spaces

To understand the energy usage pattern within the UKZN residences, it was important to also consider how energy was being utilized outside the confines of individual rooms of the students. Thus, the participants were asked to list the different electrical appliances found in the shared spaces such as kitchens, corridors and entertainment rooms. Noticeably, a student had full control of appliances within his or her room and had minimal control over the appliances located within the shared spaces. As a result, it was difficult to estimate the usage of electrical appliances in terms of hours per day. Rather students were asked to note and rate whether the identified electrical

appliances were rarely, frequently or used all the time. Figure 5.9 below depicts how energy was utilized within the residences, outside the students' rooms.

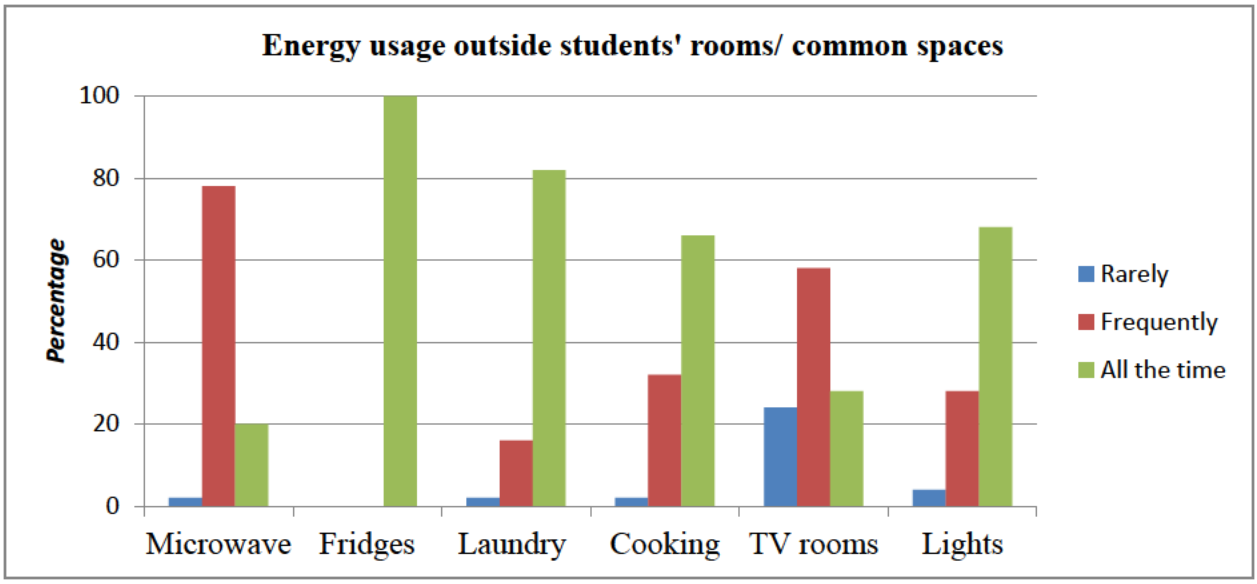

Figure 5.9 Energy usage outside students' rooms/shared spaces

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

Figure 5.9 shows that most students in the study noted fridges, laundry services, cooking facilities and the light system as the major energy intake in the shared places. Thus, over 60% of the students stated that these major energy intake facilities are constantly on all the time unlike the microwave and the televisions. Stoves and lights were perceived to be in operation almost all of the time. Nevertheless, students expressed concern over the constant usage of laundry services because they had to wait for long hours to wash their individual laundry. Data from the in-depth interviews also confirmed that the laundry machines were used by the students all the time.

> *We have microwaves on each floor or kitchen but I will not put it as a major contributor of power consumption. However, my worry is on the washing machines and the tumble dryer in our laundry rooms. I have noticed the students are always in these rooms, washing and drying 24/7 their clothes but the issue is that the drier draws a lot of electricity (Hassan, October 28, 2015).*

> *We have a lot of appliances in the share spaces because it is a big building with around 171 students. We have fridges, stoves, laundry machine and dryers with utilize a lot of energy. There are also residential televisions but some students have their own TVs in*

their rooms with radios and computers. The 5 washing machines and the 5 dryers utilize a lot of energy (RA3, October 30, 2015).

In residences all life depends on electricity because you cannot do much without electricity. The lights are always on 24/7, we have stoves that are almost always on because some people cook during the day and others at night. Some people just leave stoves on after they have done their cooking (RA1, November 1, 2015).

We have microwaves which some students just leave running even after warming-up their food. We also have washing machines and dryers that work 24 hours a day and these they consume a lot of electricity (RA5, October 29, 2015).

It is clear that the participants in the study acknowledged that most of the appliances in the residences consumed a lot of energy. For instance, the fridges (225 Kwh), stoves (3000 Kwh) and lights (CFL 20 kWh) (Energy-use, 2015). The laundry machines are major contributors to energy consumption and they are used almost all the time. The tumble dryer consumed 3 000 watts and took 50 minutes per load, likewise the washing machine consumed 3 000 watts but took 75 minutes to wash a single load (Energy-use, 2015).

The most interesting aspect in Figure 5.9 above is the television room that showed a somehow balance regarding the way the televisions were operated. Most students in the study, 68%, stated that televisions were frequently used, while 28% said that the televisions were switched-on all the time and 24% argued that the televisions were rarely used. Strikingly, a television consumes 300 watts of energy per hour hence if it is switched on for a longtime it will consume a considerable amount of energy as well (Energy-use, 2015). Televisions were most likely to be switched on as indicated by the students because they were a form of entertainment to students residing in the residences. Female students mostly used them in the evening to watch local TV soaps such as *Muvhango, Generations* and *Skeem Sam* whilst the male students mostly watched sports, particularly football. The interviews with RAs also showed that televisions were constantly switched on even if no one was inside the TV-room.

For instance, when they are watching TV they leave it on afterwards even if there is nobody watching it and as a RA, I have to switch it off whenever I find out that it is not attended to. Some students just leave their computers on even if they are not there.

They also have phone charges that are constantly plugged in which also uses a lot of energy as well (RA3, October 30, 2015).

This section has shown that students' rooms and the residences' shared spaces were equipped with different electrical appliances that consumed a lot of energy. This assertion was also highlighted by Jiang et al (2013), who found that over 95% of energy consumption within a university is consumed within buildings. Residential halls contribute a significant percentage to that energy budget of 95%. Therefore, energy reduction efforts have to be directed towards the alteration of student's practices and behaviours so that they use their electrical appliances in a pro-environmental manner.

5.6 Students' practices and behaviour towards energy consumption

EC is a relatively new environmental approach that is geared towards inculcating green behaviour amongst individuals so that they reduce their carbon footprint. EC theory seeks to equip university students with pro-environmental values and knowledge to propel the sustainability agenda forward (Kagawa, 2007). As illustrated in the previous section, environmental education can be utilized as a catalyst tool that can modify students' behaviour in issues pertaining to energy conservation. However, Kollmus and Agyeman (2002) argued that the introduction and promotion of environmental education alone will not automatically result in individuals altering their behaviour. Correspondingly, Brewer et al (2011) in their analysis of a student-dorm energy competition stated that environmental information that was distributed to students did not guarantee behavioural change in the dorms. From Brewer et al's (2011) study, it is clear that environmental education cannot be the ultimate tool in curbing the contemporary energy crisis but it must be supported by participatory activities that motivate people to embrace the notions of EC.

Owen and Driffill (2008) stated that green-behavioural change is highly influenced by trust, awareness and commitments to environmental issues. Wolf et al (2009) demonstrated how trustworthy informal networks of community groups were successfully utilized as vehicles for motivating individuals to respond to climate change in their study. The EC theory argues that if meaningful energy reductions are to be attainable, there is a need for individuals to voluntarily modify their practices and behaviour to become responsible for their environmental impacts (Scott

et al, 2012). This section sought to document students' practices towards the way they operated or used the appliances in the residences.

5.6.1 Lights

Students' rooms in the residences used to have 60 watts lighting bulbs that consumed a lot of energy but the UKZN Energy Management Program (EMP) replaced all the 60W incandescent bulbs with Compact Fluorescent Lights (CFLS). This initiative was implemented after an energy audit conducted in 2005 reported that the lighting system at UKZN was contributing significantly to the total cost of energy. Govender (2005:98) noted that "the university was spending over R4 million towards electricity usage on the lighting system on a yearly basis". In supporting the EMP efforts, DSRA placed notices that sought to encourage students to switch off their lights whenever they leave their rooms (UKZN, 2015e). This study asked students to indicate how often they switched off their room lights when they leave the room and when they went to sleep. Figure 5.10 below shows students' behaviour pertaining to the switching off of their room lights.

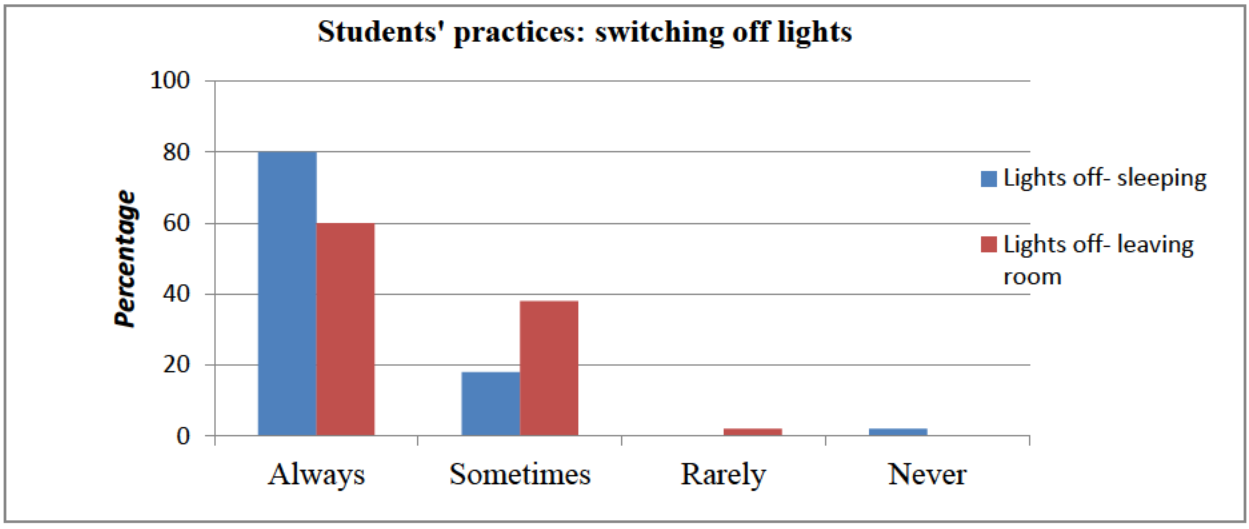

Figure 5.10 Students' practices: switching off lights

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

Figure 5.10 illustrates that most student were very cautious towards switching off lights when they leave their rooms and when they went to bed. The students were more likely to switch off their lights when they went to bed, 80%, compared to when they leave their rooms, 60%. Nevertheless, Figure 5.10 shows that students in the study demonstrated a responsible trend of switching off their

lights when they were not using them. This data contradicts the findings in the previous section that showed a negative attitude of students towards energy usage. Interestingly, students were asked to explain their responses. In explaining, 70% of the students indicated that they switched off their lights because they failed to sleep when the light was on whilst other students, 10% stated that they switched off their lights as a way to conserve energy. On the other hand, 2% of the students indicated that they never switch off their lights when they went to bed because of safety reasons. Therefore, the practice of switching off lights was not motivated by the will to conserve energy, rather it was because most students were not comfortable to sleep whilst their lights were on. This explains why only 60% of the students stated that they always switched off their lights when leaving their rooms during the day and night, whilst 38% indicated that they sometimes switched off the lights. Data from the interviews showed that students tend to leave their lights on even when they were attending classes on campus.

> *Some students tend to leave their light on in their rooms and they go and attend the whole day on campus or sometimes they can go home over the weekend and leave the lights on and I think that contributes to energy wastage (RA4, October 28, 2015).*

> *Most student just leave their lights on when they go to campus for their lectures. If one block leaves the light on it will be a lot of energy used (Jojo, November 10, 2015).*

A study conducted by Kahler (2003) on the ripple effect of a dormitory energy competition also showed that the majority of the students switched off their lights both when went to sleep and when they left their rooms. In contrast to the findings of this study, Kahler (2003) notes that there were no major disparities in terms of switching lights whether one was sleeping or leaving his or her room. This was mainly because students were very much aware of how their efforts would positively contribute to energy reduction in their respective residence. In addition, "an energy team encouraged students to always turn off their lights whenever they leave their rooms so that they would save a good deal of money and energy" (Kahler, 2003). Thus, environmental awareness explained the disparities between students at UKZN and those in Kahler's (2003) study. The former mainly switched off lights when sleeping because they felt uncomfortable sleeping with their lights on, whilst the latter was well aware of the impacts lights had on energy consumption. This showed the importance of environmental education and ecological commitments. In support,

Lo (2015) demonstrated how the signing of environmental pledges by both staff and students within some of the Chinese universities was playing a vital role in the creation of low carbon campuses. Environmental education has the potential to influence students to assume energy saving behaviours.

Remarkably, 60% of the students in this study said that they always switched-off their lights when they leave their room and 38% stated that they sometimes switched of their lights when they go to attend their classes. The previous section has shown that environmental awareness was not the contributing factor to students switching off their lights in this study. Therefore, students were more likely to switch off their lights when leaving their rooms mostly because all light switches in the residences were located right next the door. A similar study by Lo et al (2012) on energy-related behaviour s in offices showed that the location of the switch psychologically plays an important role because if it is close to the door, workers were more likely to switch the lights off on their way out. According to Lo et al (2012:240) "switching lights on or off was regarded as relatively straight forward routine but surprisingly lights were frequently left on if the switch were far from the exit points". Furthermore, Lo et al (2012) reinforced EC's contention that people's behaviour can undermine energy saving initiatives hence raising environmental awareness is of paramount importance. The importance of environmental awareness was also illustrated in a study by DeWaters and Power (2011). In the study by DeWaters and Power (2011), the majority of students reported that they always switch off their lights when leaving their rooms because they were taught the importance of saving energy at their school.

The inquiry into UKZN students' practices towards switching off lights was important because the EMP initiative's success of reducing energy usage by replacing the 60W bulbs with CFLS depended on the students' willingness to switch off lights. Thus, students' practices had the ability to either enhance or dampen the effect of energy reduction initiatives. However, students are more likely to enhance these technologically based initiatives if they are actively involved in the green campus programs. The involvement of students in any on-going energy conservation initiative has the ability to bring a positive result especially if the students embrace the tenets of EC. A comparative study in Australia between the University of Griffith and the University of Plymouth showed that the latter was far ahead in terms of conserving energy than the former. This was so because students at the University of Plymouth were actively involved in the energy-campus

initiatives and 90% from the 1 889 interviewed had a positive attitude towards environmental issues (Kagawa, 2007). In contrast, students at Griffith University had minimal knowledge, interest and understanding of environmental issues. As a result, the majority of the students were not actively involved in energy- related projects at Griffith University (Kagawa, 2007).

5.6.2 Electrical plugs and appliances

The number and types of electrical appliances that an individual owns determines his or her energy consumption rate. The previous section has shown that the majority of the students in the study owned more than three electrical appliances in their rooms and this undoubtedly had a major impact on energy consumption. Cabeza et al (2014:189) notes with concern over "the continuing demand for new advanced large and small appliances with new functionality by people that is rapidly increasing electrical consumption". The same assertion is applicable to students, who have the impulse to acquire new sophisticated ICT electrical devices as illustrated in Figure 5.8. According to Cabeza et al (2014:193) a "recent trend in energy consumption shows that electrical appliances account for an increasing amount of building energy consumption". Thus, electrical gadgets and appliances generally consume a lot of energy and individual behaviour or practice is central in controlling that energy consumption rate. Moloney et al (2010) argue that, raising environmental awareness particularly around energy consumption is vital but reduction in energy usage largely depends on the individual's attitude and behaviour. Therefore, individual behaviour or practices towards switching-off unused electrical appliances and plugs has a significant impact on the energy consumption rate. It is against this background that the study made an inquiry into students' behaviour towards the unplugging of unused appliances and plugs. Figure 5.11 below shows how often students switched off unused plugs and appliances within their residences.

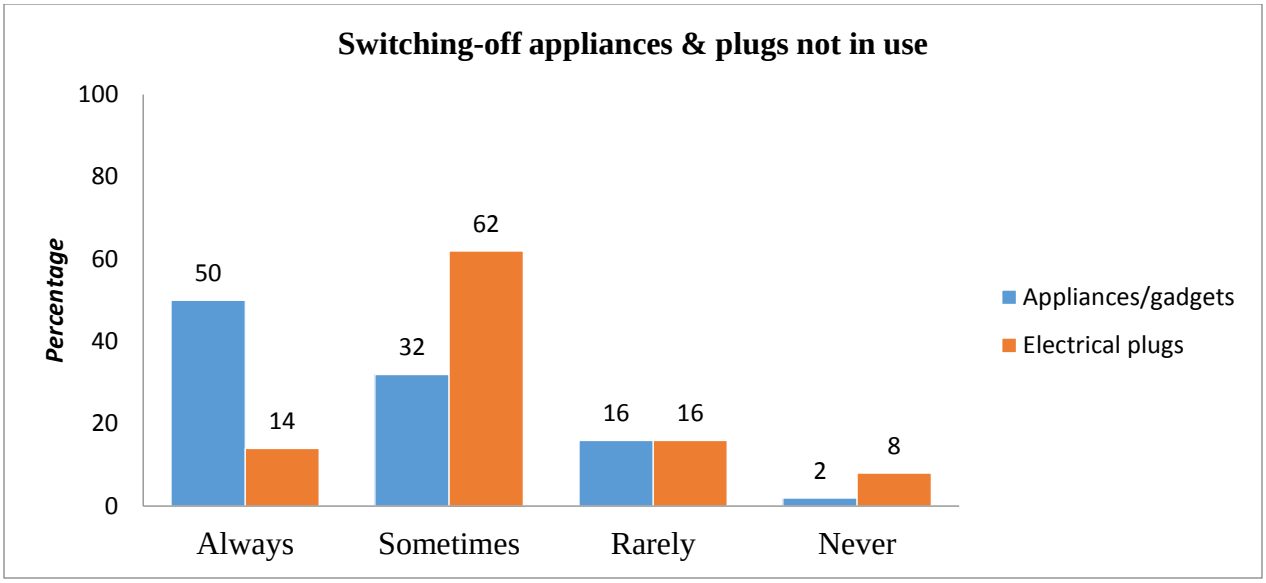

Figure 5.11 Switching off appliances and plugs not in use

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

Figure 5.11 shows that half of the students, 50%, stated that they always unplugged their unused appliances as compared to only 14% who said they always switched off their unused plugs. However more than half, 62%, of students frequently switched off their unused electrical plugs whilst only 32% were likely to do the same for their unused appliances. The study showed that students were more likely to switch off unused appliances than electrical plugs. However, even if appliances are turned off but remain plugged in, they continue to draw a considerable amount of energy because of the 'stand-by power' mechanism. Hence, data drawn from students' practices towards the switching-off of electrical plugs explains the high levels of energy consumption at UKZN (Singh, 2010). In support, the in-depth interviews also highlighted that energy consumption in residences was high mostly because of irresponsible behaviour towards appliances and plugs.

> *You have your electrical chargers that are basically plugged on the whole day, even when students are not charging their phones or laptops. In addition, here in our residence we have students forgetting to switch off their lights or to switch off the stove when they are not using it. Oh! also in the TV-room the TV plays all day even if no one is watching it (Pipi, October 26, 2015).*

> *I am not sure about UKZN as a whole but at my residence energy is wasted because students have this wasteful mental like they will actually put all the four plates stoves*

on to warm them whilst they are studying in the kitchen. This practice definitely results in energy wastage in our residence (RA4, October 28, 2015).

Sometimes students use the stoves in the kitchen just to light-up their cigarettes and they use them as heaters as well when they will be chilling and chatting in the kitchen especially in winter (RA2, October 31, 2015).

You know we are using hot plates in the kitchen and we find that standard factors like behaviour, maybe negative attitudes from certain students who tend to leave the hotplates switched-on after they are done with their cooking (Hassan, October 28, 2015).

The above quotes are consistent with Parece et al's (2013:467) assertion that "the key issue on University campuses is how to promote and implement environmentally pro-behaviour among students who have decision making power over the usage of appliances". Clearly, students were in direct control of the electrical appliances in the residences and their behaviours were escalating energy consumption rates. Notably, energy consumption rates are likely to be altered by activities that include switching off lights and unplugging appliances that are not in use (Parece et al, 2013). However, the study showed that students' actions actually propelled energy usage as they would leave the stoves on or simply used the stoves as heaters. DSRA officials mainly attributed energy wastage in the residences to the fact that students were hardly concerned about energy consumption.

When cooking, they (students) tend to leave the stove on after they are done. Not many of them switch the lights off when they leave their rooms. Now the laundry issue is another major one. The washing machines are always on every single minute, there is always a long queue for the washing machines even during the vocational period (RA2, October 31,2015).

Some people just leave stoves on after they have done their cooking. We have microwaves, which some students also leave running after warming up their food. We also have washing machines that are used by students 24 hours a day as well. These

are the things that consume a lot of electricity here. Even when you tell them to switch off their light when they leave their rooms, they rarely listen (RA1, November 1, 2015).

Students are very unconcerned about that (energy consumption), even when their clothes are dry, the will let the empty dryer run for a very long time. The student will be in his room sitting there while the dryer will just be running even if his or her clothes are ready (RA3, October 30, 2015).

Some students even switch on the washing machines when it is empty and if you ask them why they are switching it on. They will simply say that they were testing if it is working, even though they are not prepared to wash at that time. Now the washing machines will have to run the full cycle empty. Sometimes students switch-on these washing machines whilst to go to fetch their laundry, so that other students will think the machine is in use (RA5, October 29, 2015).

The majority of the students residing in the university residences were not concerned about the alarming rates of energy consumption since they felt that they had 'paid' for the services and they could use them as they pleased. This belief and practice by students, contradicted the EC fundamentals principles that called for the establishment of sustainable green campuses initiatives to reduce energy consumption. Dahle and Neumayer (2001) rightfully argues that the common barrier to green campuses would be the lack of interest towards environmental issues by students. The majority of the students in the study demonstrated through their behaviour that they were not concerned with the fact they were contributing significantly to energy consumption. For instance, data from the interviews showed that most of the students were not switching off unused appliances such as stoves, washing machines and microwaves. This automatically had a huge impact on energy usage because these machines consumed a lot of energy.

A study by Maistry (2012) at the University of Johannesburg earlier showed that the high-energy consumption rates were attributed to the inefficient use of electrical appliances. Students were not switching off their computers and lights when they went to attend their classes (Maistry, 2012). The same trend was highlighted at the University of Michigan, whereby behavioural observation showed that the students and staff members never turned off their computers and lights during the day as an indication to others that they were using the workstations (Marans and Edelstein, 2010).

At Tufts University, 80% of the students reported that they 'nearly always' leave their computers on. When asked about energy issues, the majority of the students at Tuft University stated that their degree programmes were not linked to any environmental issues (Marcell et al, 2004). Likewise, these studies show the importance of environmental education within the 'university community'. Therefore, there is a correlation between students' everyday behaviours and their levels of energy literacy. The lack of environmental concern and the negative behaviour towards energy usage at UKZN by students, consequently contributed to the high levels of energy consumption. The negative behaviour displayed by students towards the use of electrical appliances and plugs also was a safety hazard as argued by the DSRA officials.

> *Energy consumption in residences is linked to the use of big appliances within the students' rooms. You will find a small room meant to accommodate a single student filled with lots of appliances. The student will be having a huge hi-fi system, a big refrigerator and a microwave, all of these appliances would be plugged in a single plug point, and as a result the plugs are constantly tripping (Dudu, October 26, 2015).*
>
> *Students leave stoves on and then the switches burns, the plugs melts. They overload the power points in their rooms with the various appliances and most often these plugs or power points gets burnt or damaged and we are constantly replacing them but it's costly (Buddie, November 10, 2015).*
>
> *I have seen students putting the whole metal-pot in the microwave and I do not know if its ignorance or lack of knowledge but we have posters in the kitchen prohibiting that because metals can spark fires in the microwaves. But then again if you cannot see the sign in front of you, then you are not going to see the one behind you (students' adherence to rules) is that not so? (Hassan, October 28, 2015).*

The points raised by the DSRA staff members showed that energy literacy is not only important in curbing energy consumption rates but could be a precautionary safety measure. In addition to the high electrical bills, the department incurred many costs in replacing burnt electrical sockets. This goes to show that, environmental education is an important initiative that can save utility costs within a campus setting. Data from the interviews also highlighted that students were not adhering

to the residence rules. The failure of the department to firmly enforce and monitor rules that regulate energy usage was also a contributing factor to energy consumption.

> *For example, heaters are not allowed but students do have them so yes! There are rules but students do not follow them all the time because sometimes they just get warnings if they are caught (RA5, October 29, 2015).*

In spite of the notices pasted around their residential premises, students were reluctant to adhere to the rules due to the lack of direct implications.

5.6.3 Energy regulation measures within the residences

DSRA was clear on its intention to conserve energy in the residences in order to reduce its electricity bill. The department encouraged students to save electricity by switching off lights and appliances that were not in use. Furthermore, the department had rules that prohibited students to own or use hotplate stoves, electrical heaters, microwaves and kettles within their rooms (UKZN, 2015e).

> *We give students booklets with information on what is required in the residences, they are informed on what to bring and what not to bring especially on appliances. We do provide microwaves, stoves and fridges for the students in every kitchen so that they would not have to bring them here. Now when you go to the students' rooms you will find a lot of gadgets that are not permit by the department and in such cases we always ask the RAs to be vigilant (Jojo, November 10,2015)*

Students in the study were asked to list the residence rules that were centered on the use of electricity. Interestingly, only a few of the students stated that they were expected to switch-off their lights when leaving their rooms. The majority of the students failed to name any energy-use regulation that they knew. This was well illustrated when students were asked whether they were aware of the residence rules regarding energy usage. Table 5.7 below showed that only 18% of the students in the study were aware of the residence rules whilst almost two thirds of the students, 64%, said they were not aware of the rules.

Table 5.7: Awareness of residential rules centered on energy use

Students' responses		Frequency	Percentage	Valid Percent	Cumulative Percent
Valid	1 (Yes)	18	36	36	36
	2 (No)	32	64	64	100
	Total	**50**	**100**	**100**	

Source: Own calculations from the Student Electricity Behaviour Survey (SEBS) data

The study showed that the majority of the students were not aware of the residential rules in spite of the claim by the residential officers that the rules are communicated to the students. The previous section on energy related programmes showed that the department had no energy related programs that were aimed at encouraging energy conservation. Hence, the unavailability of such platforms to raise students' consciousness towards energy usage resulted in students not being concerned about energy regulations. Apart from the disparities regarding the awareness of residence rules on energy consumption, the department itself displayed a weak monitoring approach in enforcing the rules as shown in the quotes below.

> *We have what we call 'Residences checks' at our residence. So what happens is, as a department we randomly go the students' rooms to check if students are not in possession of the prohibited appliances and other things that are not allowed in the residences. Those found with such appliances will have their appliances confiscated until the end of the semester or they can pay a fine of R150 (Pipi, October 26, 2015).*

> *I take it upon myself to actually try and reprimand those who are doing unacceptable behaviour like leaving the lights on and those in possession of big electrical appliances by giving them warnings and fining them (RA4, October 28, 2015).*

> *I am very much sure that even though heaters and hotplate stoves are not allowed here, students have them and they hide them inside their rooms. We have taken some of the stoves from the students as well, but you can take them away today and tomorrow they would have replaced them (RA1, November 1, 2015).*

Besides that, we sometimes do the residence checks and we always find that students have numerous appliances in their residences that range from fridges, heaters and even microwaves. So we sometimes confiscate these appliances because they consume a lot of energy in our residences (Jojo, November 11, 2015).

The data gathered from the interviews showed that DSRA did not apply a standardized set of rules on energy usage. Some officials simply gave warnings, some issued fines and others confiscated the prohibited appliances from students. Moreover, the DSRA officials in the study did not constantly apply these measures to offenders but rather they were lenient towards students. As a result, students were not really worried about being caught with the prohibited appliances since they knew they could talk their way out of having it. This explains why in Figure 5.8 a significant number of the students in the study had some of the prohibited electrical appliances in their rooms. If caught, students were comfortable with paying the energy fines for the high-power appliances imposed by the RAs as highlighted by one of the RA.

Obviously, you need to confiscate the appliances probably until the end of semester either way you need to give them back those items when they are leaving. Now when residence opens the students come back with the same appliance that are not allowed. Even if you fine them some students do not really care, they will tell you that their bursary will pay for the fine so the money does not come from their pockets so they will not care (RA5, October 29, 2015).

The attitude expressed in the above quote was totally in contradiction with the notions of EC theory on conserving the natural environmental. The theory argued that environment justice should not be about one's ability to compensate for his or her environmental degradation, but should be about individual's responsibility and willingness to conserve the environment (Jager, 2009). The negative attitude expressed by some of the students in the study explains the high levels of energy consumption at UKZN. Due to the lack of environmental education, students seemed not to understand the crucial link between their behaviour and the university's carbon footprint. They were much more concerned about settling the fines or replacing the confiscated electrical gadgets not realizing how their behaviour was negatively affecting the environment. This finding supports Mulder et al's (2015) assertion that the general hindrance to sustainable campus projects is the fact

that impacts of such initiatives can only be realized after a long period of time. Therefore, some of the students in the study were reluctant to modify their behaviour because the environmental catastrophes or benefits were not tangible within a short span of time.

In addition, students were not aware of how much the university was spending on the electricity bill nor were they given any energy usage feedback. According to Brewer et al (2011:2) "unlike a home environment, students do not financially benefit from any reduction in electricity use because of the flat residence fees. There are no monthly bill and students are completely unaware of their energy usage". Brewer et al's (2011) observation relates to the findings of this study because students argued that they were not aware of their electricity usage and even if they altered their behaviour, it will not lower their residential fees. In spite of being unaware of the annual electricity bill for UKZN, students were asked to estimate the costs as shown in Figure 5.12.

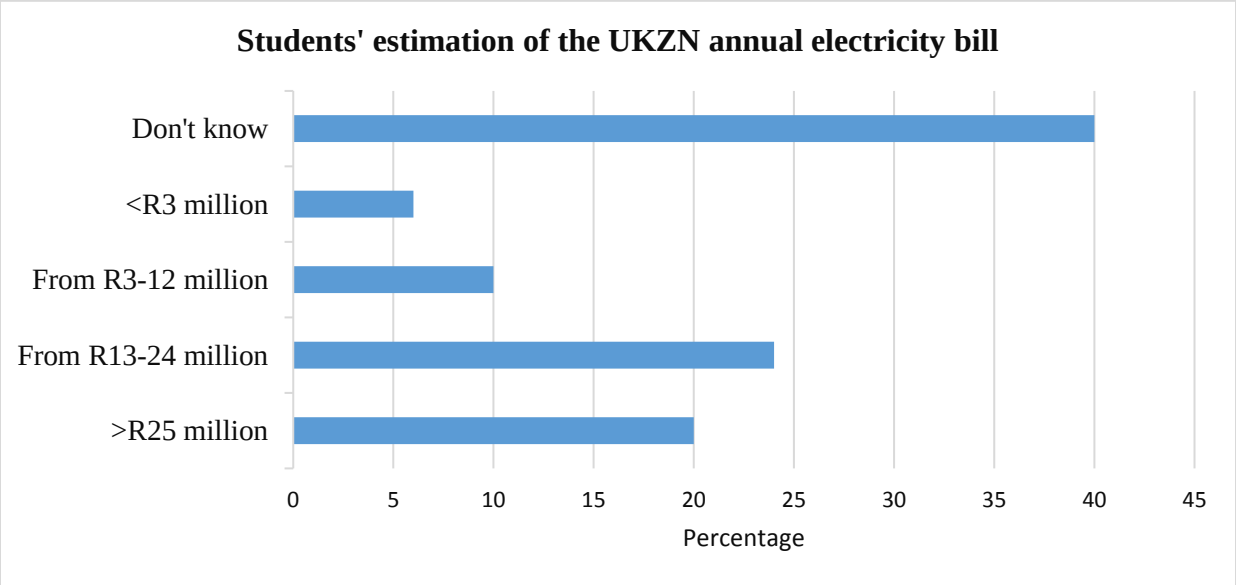

Figure 5.12 Students' estimation of the UKZN annual electricity bill

Source: Own calculations from SEBS data

The majority of the students, 40%, indicated that they had no clue in terms of the annual electricity bill hence they stated that they did not knew how much UKZN was paying in its electricity bill. Figure 5.12 also shows that a significant number of the students estimated that the annual electricity bill for UKZN was high ranging between R13 and R24 million. Students in the study totally underestimated the electricity bill because Knox (2013) indicated that the University was

paying approximately R100 million per annum for the electricity bill. Nevertheless, Figure 5.12 illustrates Brewer et al's (2011) argument that students may never know how much electricity they will be using due to lack of feedback and monthly bills. As a result, it was challenging to motivate individuals to reduce their energy consumption when they were not aware of how much they were currently using due to lack of feedbacks from the DSRA. According to Heiskanen et al (2010: 7588) "energy feedbacks are important for motivating and empowering individuals to save energy because they make people aware of the difference they will be making". In support, a study by Abrahamse et al (2005) indicates that participants who knew their energy consumption rate save more energy compared to those who did not receive their energy feedbacks. Likewise, an energy competition between four residence dormitories highlighted the importance of feedbacks and energy meter-readings to students because these aspects greatly modified students' behaviours even after the competition (Brewer et al, 2011). In contrast, this study showed that students were not subjected to environmental education, they were not given any energy usage feedback nor did they know their energy consumption patterns. As a result, most of the students in the study were not concerned about saving energy as illustrated by their attitudes and behaviour towards energy consumption.

On the other hand, DSRA officials were not firm in enforcing the energy regulations such that students took advantage of those glitches and engaged in practices that resulted in energy wastage. The effect of firmly enforcing energy rules in reducing energy consumption within a campus setting was reflected in a study conducted by Lo (2015). According to Lo (2015) students were subjected to the 'Electricity restriction policy' that had six clauses attached to it. The clauses made students aware that "electricity usage that exceeded the prescribed limits would be charged a fee of 0.525RMB/kWh" (Lo, 2015:38). All dormitories had energy meters installed and each room had a maximum power of 2,500watts. If a student was to exceed that limit, his or her meter would automatically cut-off electricity in the room (Lo, 2015). Consequently, the energy consumption levels were very low and students were cautious about their behaviour towards energy consumption. Notably, the eight universities in Lo's (2015) study also prohibited the use of the same electrical appliances such as kettles, heaters and stoves that were not allowed at UKZN. Nevertheless, students at UKZN owned and used these appliances in their rooms because of the weak energy regulation approach by the DSRA officials.

5.7 Conclusion

It is important to note that UKZN has an environmental policy that focuses on conserving the physical environment. It is also a signatory of the Talloires Declaration. In essence, through the environmental policy UKZN projected itself to be environmentally cautious in its operations and it emphasized the need to develop a conservation culture at the university. Nevertheless, evidence from the study demonstrated that UKZN is far behind in the creation of a conservation culture as far as energy consumption patterns are concerned. The major obstacle to the 'green campus' initiative was the lack of environmental awareness and energy literacy mostly amongst the student community. Environmental education is not prioritized at the institution and the study showed that the participants regarded UKZN's commitment to the low carbon principles as being poor. Consequently, students residing in the university residence displayed negative attitudes and behaviour s that escalated energy consumption rates. The findings from the study also showed that the weak enforcement of energy regulations of the officials encouraged students to own and use the prohibited electrical appliances in the residences.

Chapter Six: Conclusion and Recommendations

6.1 Introduction

This chapter presents the conclusion to this study which focused on students' energy conservation knowledge by determining their behaviour and attitude towards energy consumption within the university's on-campus accommodation. The chapter also offers recommendations which could be put in place in order to reduce energy consumption within the university community and beyond campus life.

6.2 Study conclusion

Students' energy conservation knowledge is considered to be a critical aspect of any campus-based 'green-initiative', as research presented in the literature on energy practices in universities argues that it determines the universities' energy consumption patterns. Chapter 2 revealed that institutions of higher education are now becoming 'major-players' in establishing environmental discourses around low carbon societies. According to Amaral and Martins (2015), the large student population that is accommodated by universities means that universities have a significant impact on both the natural environment and energy consumption rates. As a result, universities are regarded as significant contributors to greenhouse gas emissions due to their spatial footprint, and the various activities that are conducted within universities which use large amounts of energy.

Many governments have already tasked their colleges and universities to reduce their energy consumption and to incorporate environmental education within their curriculum or teaching materials. For example, the South African government has urged all the higher education institutions in South Africa to cut-down their energy consumption rates by 20% by the year 2020. The eThekwini Municipality has also intensified its efforts to establish low carbon citizenry by targeting learning institutions in most of its programmes, in order to raise environmental consciousness within universities (eThekwini Municipality, 2014). In the midst of all these calls for universities to reduce their energy consumption, it is paramount to highlight that any 'green-campus' initiative that does not have the backing or support of the students is likely to fail. This is so because students are the major component of any campus-based programme and their support is crucial. It is on this premises that this study sought to document students' attitude, behaviour and practices towards energy usage at UKZN. In an effort to gain a holistic understanding of

students' practices, attitudes and behaviour the study employed a mixed methods approach (qualitative and quantitative methodology). The mixed methods approach was important in the analysis phase because it enabled the researcher to develop a comprehensive account of students' attitudes and behaviours, through the integration of data gathered from both energy surveys and in-depth interviews. In addition, secondary sources of data which included case studies and literature on environmental issues was incorporated in the data analysis phase. Ecological Citizenship (EC) theory provided the theoretical framework of the study and it was used as a frame in assessing students' practices in relation to the notion of a low carbon society. EC theory outlines how ecological citizenship is constructed, produced and put into practice within society. According to Dobson (2003), EC revolves around individuals' environmental responsibility so that they conduct themselves in a way that minimizes ecological destruction through reducing their energy consumption rates.

Previous studies conducted at UKZN by Govender (2005), Singh (2010) and Knox (2013) argued that the university's electricity bill was extremely high due to the over-consumption of energy within the university's building. Hence, this created the impression that students were wasteful and ignorant of environmental issues. EC theory argues that individuals that are equipped with the necessary environmental knowledge are more likely to conserve energy in their daily activities (Dobson, 2003). In support, Levy and Marans (2012) contended that environmental knowledge has the ability to positively motivate students to conduct themselves in a pro-environmental manner. Therefore, high energy consumption patterns can be regarded as indicators of little or no environmental education or awareness. Surprisingly, data from the study showed that most of the students had moderate environmental knowledge and could articulate some of the causes and consequences of the energy crisis in South Africa. This realization challenges the arguments in the ecological citizenship literature because some students were wasteful of energy, and yet they were also aware of the environmental impacts of their actions. It is on this basis that this study argued that an individual's energy consumption pattern in a public or shared 'space', like a university, is highly influenced by his or her attitude towards energy usage and his or her behaviour in relation to this attitude.

The study illustrated that the high-energy consumption rates at UKZN are associated with the negative attitudes and mistrust that students have towards university management in terms of

energy saving benefits. For example, the majority of the students in the study argued that the management would raise tuition fees regardless of whether students save energy or not. As a result, students felt that conserving energy would never translate into any fees reduction. This stance is explained by Kahler (2003) who noted that students will not notice the benefits of saving energy within a short period of time because they are charged fees on an annual basis. Thus, energy saved during the course of the academic year by students will not have any short-term impact because they would have been charged a flat-accommodation fee already. Ecological citizenship theory's assertion that environmental education has a 'double-effect' of altering individuals' behaviour and reducing the utility costs tends to be applicable to households and private 'spaces'. For example, households can easily see the impacts of their energy saving efforts within a month because they receive monthly electricity bills. Whilst students on the other hand may never see the university's electricity bill, hence they will not be aware of the immediate impact of their energy saving actions.

This study demonstrated that students were most likely to embrace pro-environmental actions if such actions are accompanied by incentives and acknowledgment, praises and recognition. Similarly, a study conducted at Coventry University by Broughan and Hartless (2011) indicated that students were motivated to participate in energy-saving initiatives if they were to receive incentives. The majority of students in the study indicated that they would participate in energy-saving programmes if it meant that they would receive a reduction in their university fees. To this end, the study professed that tuition fees played a crucial role in shaping students' attitudes and behaviour within a campus setting. University tuition fees are central to students' perceptions and behaviour and these claims are reflected in the current student protests, FeesMustFall which are lobbying for free-higher education in South Africa. Students in the study claimed that the university was over-charging them and terms such as 'capitalists' which depicts exploitation, were often used to describe the university management. Certainly, students' perceptions of the management influenced their attitude and behaviour towards energy usage as well.

The energy use patterns of students in the study portrayed a negative and discourteous attitude regarding energy consumption at UKZN. The majority of the students were not concerned about conserving energy in the residences because they felt that they had already paid for it. Energy use patterns drawn from the surveys revealed that energy is wasted in the shared spaces such as kitchens, laundry rooms, corridors and entertainment rooms. The televisions, laundry machines

and stoves were frequently left switched-on even if no-one was attending to them and this contributed to the over-consumption of energy. The reason behind the over-usage of energy in shared spaces was the fact that there was no sense of responsibility or 'ownership'. The 'green-attitudes' and environmental responsibility advocated by EC theory were not evident in this study because students felt entitled to use energy as they wished and they justified this stance by stating that 'they were paying a lot of fees'. Interestingly, the majority of students felt that it was the management's responsibility to monitor how energy was being used within the shared spaces, whilst residence officials argued that the mandate was upon the students themselves.

On that note, it is possible to argue that there were no clear energy responsibility roles at UKZN since the management contended that students were the end-users of energy in the residences hence they were the ones responsible for conserving energy. To a large extent, the study affirmed that the residence officials lacked stewardship in fostering the notions of ecological citizenship with students because there were no 'green-programmes' implemented in the residences. Data from the study illustrated that energy-saving information was mostly disseminated through the use of posters or notices which students hardly read. Surprisingly, this realization was contrary to the founding principles of the UKZN environmental policy that was geared-towards reducing the campus's carbon footprint.

This discrepancy was not only peculiar to UKZN but Rickerts et al (2007) also outlined that environmental policy on electricity at Rhodes University, South Africa, never elaborated on how energy was to be used efficiently by the university community. The results of this study echo Singh's (2010) findings where staff at UKZN indicated that the university did not have any 'greening' initiatives or procedures that provided guidance regarding energy conservation. Likewise, students in the study rate UKZN's commitment to energy conservation as 'poor' because there were no programmes designed specifically to raise environmental awareness. Data from the in-depth interviews revealed that less attention was given to the implementation of 'green-initiatives' by the management. UKZN's management failed to stimulate a conservation culture amongst its students. Consequently, this assertion explained the lack of energy literacy at UKZN and could also explain the negative perception exhibited by students towards environmental issues.

UKZN's management did not only fall short in raising environmental consciousness amongst its students, but also by not enforcing and monitoring the energy-use regulations stipulated in the residence rules booklet. Foremost, the majority of the students stated that they were not aware of residential rules that are centered on electricity usage because this was not covered in their orientation into residence. Neither were the energy regulations addressed once they formed part of the residence community. However, data from the in-depth interviews affirmed that the energy regulations are available on the official university website and the notice boards. Consequently, the disregard of the residence rules or regulations by most students meant that students did not respond to the way in which these rules were communicated or enforced. As highlighted by the study, a significant number of students owned most of the prohibited appliances that are contributing significantly to the electricity bill. This trend is reinforced by a weak energy-use monitoring programme and a lack of political will by management to strictly enforce energy-use rules. For instance, some residence officials simply issued warnings, whilst others fined the offenders. Some officials would confiscate the prohibited appliances. The study revealed that there was no consistency in implementing these measures, and hence students expressed no remorse regarding their energy wasting behaviour.

A similar study by Lo (2015) conducted among eight universities in China showed a very different outcome, where students were very cautious about their energy consumption patterns because of the energy restriction policy that was in place. The case study in China shows that different contexts can provide different results. The Chinese context is mostly characterized by conformity, hence it is relatively easy to get students to adhere to regulations. In addition, the Chinese residence had meter readings installed in each room so that students actually saw their energy consumption rates. In contrast, students at UKZN were not aware of their individual energy consumption rate neither did they know the monthly bill of the university. This comparison reinforces the importance of feedbacks in any energy saving initiative because people become aware of the difference they make when they save energy as demonstrated in the Chinese case study.

Govender's (2005) study noted that the lighting system was contributing significantly to the energy bill for UKZN and the EMP installed CFL as a measure to reduce this high lighting energy usage. However, this study showed that students often left their lights switched-on when they went to attend their classes and all corridor lights in the residences were always switched-on due to lack

of daylight because of the architectural design of the residences. The EMP's light initiatives juxtaposed with the study's findings clearly affirmed Moloney et al's (2010) argument that reduction in energy use within buildings largely depends on the users' behaviour and their attitudes. Apart from highlighting the negative attitudes and behaviour of students pertaining energy usage, the study showed that students had a great deal of influence and control over the use of the appliances in the residences. They also had the decision-making power pertaining to for example switching the lights on and off. This supports the assertion that any energy saving initiative within universities ought to be supported by students' attitudes and behaviour.

Hence, an inquiry into students' attitudes and behaviour at UKZN was central to this study given the increasing call for universities to bolster pro-environmental measures that are aimed at reducing energy consumption. It is important to highlight that one of the reviewers of the proposal of this study was of the notion that students were not wage earners and did not have any direct cost or impact on the environment. He also stated that most students who study at UKZN were part of the missing middle or the South African poor and hence they and their families did not contribute significantly to energy consumption in South Africa. He argued that the study should rather focus on energy consumption patterns of the large industrial sector because students' contribution to energy issues was insignificant (Bond, 2014). In challenging this notion, the study demonstrated that students possessed a significant but often over-looked impact on both the natural environment and the energy crisis within society. Students' energy consumption patterns do have an impact on the environment because of the large student population. Students will also become the future leaders, policy makers and industrial and business owners and hence developing their environmental awareness while they are at university is essential. Nevertheless, the study showed that there is still a long way to go in fostering energy conservation practices at UKZN given the negative attitudes students have towards energy conservation which is of great concern given the impending energy and environmental crisis.

6.3 Recommendations

The appointment of Mr Sifundo Nkosi as the head of DSRA in June 2015 is a significant step towards the introduction of the 'Green Campus Imitative' (GCI) campaign at UKZN. Mr Nkosi is one of the pioneers of GCI at the Durban University of Technology (DUT) and he also is the current regional director of GCI for KwaZulu-Natal. He has already declared his ambitions to

initiate GCI at UKZN hence this study can contribute to this initiative as it has identified most of the impediments to GCI. This research makes the following recommendations that DSRA can consider in its quest to effectively introduce GCI at UKZN.

- The exploration of EC theory has shown that environmental education is an important tool in encouraging students to conserve energy. Environmental education can stimulate students' environmental consciousness such that they became aware of how their daily activities can impact the natural environment surrounding them. The university ought to inculcate a sense of environmental responsibility within students through the implementation of various programmes, events and campaigns accompanied by incentives or recognition of some-sort. DUT already has a very successful 'Green-Wednesday' campaign whereby everyone at that institution is encouraged to wear a green t-shirt. The researcher of this study was privileged to officiate a green-debate at DUT and the impact of 'Green-Wednesday' was overwhelming. Thus, UKZN should stimulate students' interest in environmental issues by imitating such good initiatives from other institutions.
- The university has to devise ways that will result in the dissemination of energy information to students, particularly the electricity bill. The EMP already has meters installed in the residences that they are using to monitor both water and energy consumption patterns. Such information could be important in making students aware of their weekly or monthly energy consumption pattern. Previous studies conducted amongst students showed that students are more likely to reduce their energy consumption patterns is they are made aware of how much energy they are using. Energy-use feedbacks are also important because they make students realize the impact of saving energy because they will be able to see the impact of their efforts in reducing the monthly electricity bill. Competitions between residences which focus on lowering energy conservation could be developed and winning residences could be profiled in the university websites.
- The study illustrated that the high energy consumption pattern at UKZN is linked to students' wasteful behaviour. Therefore, a reduction in energy consumption is likely to be achieved through students' behavioural change. The university will have to encourage pro-environmental attitudes and behaviour amongst its students by

incorporating energy literacy in its curricula and degree programmes. Energy literacy will enable make students to learn how negative behaviour results in the energy and environmental crisis.

- Energy and environmental information should not only be confined to the official university website nor the notice boards, rather the university should 'walk the talk'. There should be a clear 'Plan of Action' on how the university aims to reduce energy consumption. The management should take a stewardship role in embracing the EC notions in its operations. DSRA on the other hand should be firm in enforcing energy regulations and rules so that students will adhere to all energy rules.
- The government and the university should find ways to fund and devote themselves to the 'green campus' initiative because studies have shown that significant funds can be saved if the university community starts saving energy. Financial saving from good energy practices in South Africa are paramount considering the on-going protests on fees.
- Future studies within universities should incorporate issues of water usage given that South Africa is currently experiencing drought. Hence, there is a great need to examine how the universities can play an important role in saving water and energy in South Africa.

There is still a long way to go in raising environmental awareness amongst the students at UKZN. Students are not concerned about conserving energy in their residences. The university management also lacks the political will to enforce the energy regulations within the residences. However, a significant number of students in the study indicated their willingness to learn more about environmental issues. Hence, the university management can utilise this platform and introduce environmental education so that students are exposed to environmental issues throughout their studies. The above recommendations are achievable if management engages students, mostly by providing them with energy-feedbacks so that students are aware of the difference they will be making when they save energy in the residences.

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UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

31 March 2015

Mr Takunda Joseph Mathathu
School of Built Environment and Development Studies
College of Humanities
University of KwaZulu-Natal
Howard College Campus
Email: mathathu3@yahoo.com; mathathu3@gmail.com; 209540950@stu.ukzn.ac.za

Dear Mr Mathathu

RE: PERMISSION TO CONDUCT RESEARCH

Gatekeeper's permission is hereby granted for you to conduct research at the University of KwaZulu-Natal (UKZN) provided Ethical clearance has been obtained. We note the title of your research project is:

"Exploring ecological citizenship through the lens of energy conservation as practiced by students residing in residence halls at the University of KwaZulu-Natal".

It is noted that you will be constituting your sample by randomly handing out questionnaires to students on the Howard College Campus at UKZN.

You are not authorized to contact staff and students using Microsoft Outlook address book.

Data collected must be treated with due confidentiality and anonymity.

You[redacted]

MR
RE[redacted]