“Higher education institutions and carbon management: Cases from the UK and South Africa”

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Abstract

As the world sets its eyes firmly on sustainability issues, carbon management has found its way onto the radars of higher education institutions. When one considers carbon management, global warming and climate change automatically come into the picture. To this end, carbon management policies seek to lower greenhouse gas emissions mainly through migrating to renewable energy, as well as clean and energy efficient technologies. Although South Africa has clearly defined its agenda to move towards low carbon development, the role of higher education in managing own carbon footprint is still not clearly defined. This is in sharp contrast to the situation in the United Kingdom where higher education is expected to implement carbon management strategies. From the United Kingdom perspective, carbon management in higher education institutions seeks to fulfil two requirements: (1) a contribution towards attaining national targets articulated in the 2008 Climate Change Act and (2) achieving targets set for higher education by the Higher Education Funding Council for England to have carbon management policies in place by 2011. Drawing insights on carbon management experiences from the higher education sector in the United Kingdom, this paper concludes that although higher education institutions in South Africa still lag behind in managing its carbon footprint, there are institutions that have awakened to the dictates of a decarbonized higher education sector. Evidence to this effect includes the progress made by institutions such as Rhodes University and the University of South Africa that have drawn up carbon footprints and associated management strategies. However, work still remains in terms of having more projects implemented on the ground.

Keywords: higher education institutions, South Africa, carbon management, United Kingdom.
JEL Classification: Q56.

Introduction

The Language Monitor (2009) shows that climate change was the most used phrase in 2009, making climate change the new buzz word. Evidence brought forward from the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) in 2007 clearly revealed and concluded that the climate has been and is changing globally due to human induced greenhouse gas emissions (GHG) largely from fossil fuel combustions (IPCC, 2007). Globally, South Africa is considered the 13th largest emitter and also the largest emitter by far in Africa (Boden et al., 2011). The GHG emissions from higher education institutions also contribute to the increase in these harmful gases. Despite increases in GHGs there are efforts to reduce these emissions. These efforts are made by different stakeholders, overall aimed at addressing the climate change problem through mitigation activities.

The United Kingdom (UK) has been at the forefront in reducing its carbon footprint. From the UK Climate Change Act of 2008, the country aims to reduce its carbon emissions by 80% by 2050 with an interim target of 34% reduction by 2030 (Visser, 2011). As part of this drive, Higher Education institutions in the United Kingdom are expected to implement carbon management strategies to reduce their carbon emissions. Included in carbon management strategies in higher education in the United Kingdom are issues regarding: drawing carbon baselines; the identification, quantification and determination of options to reduce carbon; determining realistic targets; drawing up carbon reduction implementation plans; monitoring, reporting and verification; continuous learning to amendments in carbon implementation plans; identification and allocation of clear responsibilities and sourcing of funding.

Globally higher education institutions are believed to play a critical role not only through research, education and training but also through providing solutions for the impacts of climate change in their own context. In 2008, Altan (2010) conducted a survey among United Kingdom universities, to explore the context for energy efficiency and carbon reduction. The findings reveal that about 83% of the UK universities had embarked on both technical and non-technical initiatives to reduce their carbon emissions. Altan (2010) concludes that it is important to develop systems for effectively measuring and evaluating different policies, regulations and schemes in the future as the first step to explore for universities. In 2009, the South African Government at the Climate Change Summit held in Midrand defined the agenda to move towards a low carbon development; although the role of higher education in managing its own carbon footprint was not clarified. This is in sharp contrast to the situation in the UK

where higher education is expected to implement carbon management strategies. Leaving such conditions unresolved in South African institutions will have implications for South Africa as a country, making it difficult to migrate to renewable energy and energy efficiency technologies.

What does reducing carbon emissions really imply for higher education institutions? The answer, in principle is simple, but the implementation often proves to be difficult. Despite the difficulties being faced by multiple stakeholders, there has been an effort to work towards lowering carbon emissions so as to be good environmental stewards. To this end, Higher Education institutions are now increasingly expected to take action in reducing their carbon emissions. To that end, Higher Education institution in the United Kingdom, United State of America (USA) and Australia are taking serious and visible measures to reduce their GHG emissions.

The structure of the paper is as follows: after this introduction, the second section outlines the methodological orientation. The third section presents discourses around climate change adaptation and mitigation theories. The fourth section looks at the fundamental reasons why institutions including higher education need to reduce their carbon emissions. The fifth section closely examines Institutions of Higher Education in the United Kingdom including Manchester University's carbon journey from 2005-2014. The sixth section discusses South African higher education institutions and compares it to United Kingdom higher education. The section further draws lessons from the United Kingdom higher education universities that are of value to South Africa. The last section is the conclusion highlighting striking points from the findings.

1. Methodological orientation

The main aim of this paper is to compare carbon management strategies adopted by higher education institutions in the UK, here good leadership has emerged with those in South Africa as well as draw lessons for South African higher education institutions. To respond to the aim of the paper, the following two research questions are raised: (1) Which carbon management strategies have been adopted by the higher education institutions in the United Kingdom, particularly universities? (2) How far are higher education institutions in South Africa, particularly universities in terms of putting in place measures to lower their carbon emissions? To address the research questions raised above, the paper draws mainly from publicly available online documents relating to carbon management strategies, at the state and university levels. Although a total of 50 carbon management policies were retrieved from the higher education sector in the United Kingdom those analyzed were a selected few with critical insights. The final sampling plan for the United Kingdom institutions considered two categories namely: universities with top ranking according to the 2013 Guardian's top 100 higher education institutions ranking and any other universities deemed to have critical insight for the paper. In the case of South Africa, a sole inclusion criterion was used – any university that had the required information publicly available, mainly online.

2. Theories of climate change mitigation and adaptation

There is no denying that climate change is inevitable due to the increase of GHG emissions as already mentioned from the Fourth IPCC report of 2007. Climate change occurs at different scales: global, continental, national, regional and at the very localized scale (Adger et al., 2005). Globally, it is acknowledged that climate change poses a multidimensional challenge, not only on the environment itself (changes in temperature, rise in sea levels, flooding or change in sea levels) but also socially and economically. The IPCC defines climate change broadly as any change in climate over a period of time; either due to natural variability or as a result of human activities (IPCC, 2007). This change is characterized by the increase in temperature, rise of sea levels, changing patterns of precipitation and an increase in extreme weather events such as drought, floods, tsunami and heavy storms. Such changes do not only affect the environment but have a negative impact on the global economic status and the social lives of people and other species both animals and plants.

From the above, it emerges that the IPCC highlights climate change mainly as an environmental problem. However, Sarkar (2012) in concurrence with the United Nations Framework Convention on Climate Change (UNFCCC) disagrees with this view. He argues that climate change is not an environmental problem only but is also an economic problem since it affects the economic status of poor countries which are highly dependent on primary commodities such as agriculture, forestry and fisheries.

Despite challenges imposed by climate change, different entities in their respective spheres can and do respond to such changes by either adapting or mitigating (IPCC, 2007). The IPCC (2007, p. 720) regards adaptation as the "response to climate change through adjustments that reduce vulnerability or enhance resilience against its implications". Their assertion is that adaptation practice must be regarded

as an on-going process, not as a once off practice that is taken when a disaster has happened. Adger et al. (2005) views adaptation as a practice that is reactive in a sense that it is triggered by past, current and anticipated based on some assessment of possible future events.

However, adaptation cannot happen in isolation but exists in parallel with mitigation. In order to avoid the worst consequences of climate change, humanity needs to reduce our carbon emission drastically. This can be done through mitigation practices. Kane and Janson (2003) regard mitigation as initiatives taken to reduce GHGs and to enhance carbon sinks. Over the past years, mitigating practices have been initiated with the purpose of reducing carbon emission in different constituencies. Initiatives to that end include using new technologies aiming at reducing GHG emissions, by switching to low carbon energy sources and transition from fossil fuels to solar energy. The climate change mitigation agenda received quicker appreciation mainly as a result of the global architecture under the Kyoto Protocol that prioritised such (United Nations, 1997). The adaptation agenda only gained global recognition in 2007 during the UNFCCC Conference of Parties 13th Session (COP13) that took place in Bali (Nhamo, 2013).

It must be understood that adaptation and mitigation actions should, however, have complement efforts to fight climate change. The next section discusses the importance of reducing carbon emissions in higher education institutions.

3. Why reduce GHG emissions in higher education institutions?

Why reduce carbon emission in higher education institutions? What are the opportunities and what are the risks associated with carbon reduction in higher education? How can the opportunities be enhanced and how can the risks be minimized? These questions call us to present the business case for carbon emission reduction in higher education institutions which is the focus of the present section.

Given the acute nature of climate change the private, public sector and universities have embarked on reducing their own carbon emissions. Universities, like any other institutions have a unique role to play in efforts to reduce carbon emissions. President Levin from Yale University sees universities as a hub of scientists, and a natural place for devising innovative strategies to reduce carbon emissions Jason et al. (2009). Secondly, Botton (2009) argues that universities and colleges have a moral responsibility to address this challenge, through teaching practice, strategies, research and their own practical actions. Universities and colleges like any other institutions also contribute to the GHG emissions. The high impact service needed to operate these institutions such as laboratory suppliers; construction projects; furniture; buildings and other products can be seen as contributing to GHG emissions (Thurston and Eckelman, 2011).

Following the emerging body of literature on climate change and its implications, many institutions have shown an interest in measuring their own GHG emission – carbon footprints. Different universities have a number of measures in place to reduce their own carbon emissions. To implement carbon reduction or carbon neutral programmes at any campus, there is a need to develop a novel GHG inventory tool designed to meet the uniqueness of that particular university or college (Cleeves, 2009). Riddle et al. (2009) argue that before any university or college can step up to these challenges, they must commit themselves to: (1) creating institutional structures to guide the implementation of the carbon emission plan; (2) complete a comprehensive inventory of all greenhouse gases they emit; and (3) develop a plan to become neutral, including benchmarks and time-scales.

4. Managing carbon in United Kingdom higher education

Drawing from the Greenhouses Protocol of the World Business Council on Sustainable Development (WBCSD) and the World Resources Institute (WRI), the Higher Education Funding Council for England (HEFCE) has adopted categorized GHG emissions under three scopes (Table 1), namely: Scope 1 (direct emissions), 2 (indirect mainly from electricity consumption) and 3 (other indirect emissions).

Table 1. Higher education carbon emission (scope 1, 2 and 3)

Scope	Description	Examples
Scope 1: Direct emission	Direct emissions occur from sources that are owned or controlled by universities	Direct fuel and energy use Transportation fuel used in institutions own vehicle fleets
Scope 2: Electricity indirect emissions	Emission generated of purchased electricity consumed by the university	Purchased electricity
Scope 3: Other indirect emission	Emission that is a consequence of the activities of the university but occur from sources not owned or controlled by the university	Water, waste, land-based, business travel, commuting of students, air travel (international students, staff members travelling, business Procurement

Source: Higher Education Funding Council for England (HEFCE) 2010/02.

Of late, universities and colleges have been proactive towards reducing carbon emission in their own institutions. One would ask, what are the opportunities and risks associated with carbon reduction in higher education then? From the universities' perspective reducing carbon might be the right thing to do or because everyone is doing it. Drawing from a report from the Ernst&Young (2012), there are several drivers that can cause an institution to consider lowering its carbon emissions. These drives include: (1) maintaining the license to operate; (2) managing energy risk; (3) differentiating the corporate/institutional brand; (4) generating new demand and (5) driving innovation and cost-efficiency. The Birmingham City University also identified similar drivers (Birmingham City University, 2012).

The United Kingdom government has taken a step forward by introducing policies that directly deal with reducing carbon emissions. The Climate Change Act (2008) introduced by the UK government, legally binds the government to reduce the country's carbon emissions by 34% by the year 2050 (Birmingham City University, 2012). This Act has caused governments, private companies and non-government organizations (NGOs) to embark on reducing their carbon emissions. In response to the Act, United Kingdom higher education started implementing carbon management. From the United Kingdom perspective, carbon management in higher education seeks to fulfill two requirements (1) contribute to the objective of the 2008 Climate Change Act (2) to achieve target sets for higher education by the Higher Education Funding Council for England (HEFCE) to have carbon management policies in place by 2011.

Reducing carbon emission can generate a considerable cost saving and future benefits such as lower insurance cost and good reputation (Simkin, 2004; Riddle et al., 2009). The 2006 Stern Review strongly showed that strong and early actions outweigh the cost of not acting earlier. In the UK, if a higher education institution participates in the Carbon Reduction Commitment Energy Efficiency Scheme (CRC) it is either rewarded or penalized financially depending on its carbon performance (Birmingham City University, 2012). If a university is able to reduce its carbon emission, it has the potential to reduce cost and be able to predict future cost to the university. Birmingham City University (2012) argues that there are financial opportunities and potential opportunities in reducing carbon emission. A clear example can be observed from the University of Leeds, in 2005/06 the university total energy bill was £10.8M; this reduced from to £10.3 million in 2008/09 (University of Leeds, 2011). This has further reduced the carbon emissions from 69, 529 tonnes to 69, 171 tonnes of carbon in the same period (University of Leeds, 2011). From the universities' perspective reducing carbon emission seems like the right thing to do as it credits the university with a good reputation. Globally, universities want to be recognized and differentiated from the rest.

From the business perspective Ernst & Young (2012) identifies another driver to reduce carbon emission or attain carbon neutrality as this might be aligned with their brand position or it generally relates to the aim of the company like enhancing their corporate responsibility efforts. Professor Joan Stringer from the University of Edinburgh states that their environmental credentials and carbon footprint has become a high priority for them. Since the university reputation and the ability for the university to attract funding depend on the steps the university takes (University of Edinburgh, 2008).

According to the 2009 SQW[1] report the university estate has a high potential to target saving, across both building portfolio and energy supply. Constructions of green buildings and refurbishment of old buildings in universities make sense towards the environment and the university saving money. A large number of the United Kingdom universities have started investing in green buildings and refurnished their old buildings. A clear example can be observed from the oldest university, University of Cambridge. The university has put in place a policy on the design and construction of environmentally sustainable new buildings. This policy promotes integrated passive design such as natural ventilation and daylight and the use of thermal mass and night time cooling (University of Cambridge, 2010). The policy has assisted the University to build eight new green buildings, which has been assessed for Building Research Establishment Environmental Assessment Methods (BREEAM) (University of Cambridge, 2010). BREEAM is used to assess the environmental performance of any type of building with ratings based on its environmental impacts, management, health and well beings, energy, transport, waste, land use ecology and pollution.

Green Buildings are popular amongst the United Kingdom universities. However, refurbishments and backlog maintenance, which focuses on installing meters within old buildings to enable more accurate readings on energy, are becoming more popular. A project has been rolled out by the University of Leeds to install automatic metering in all buildings for gas and electricity (University of Leeds, 2011). This

[1] Research into a carbon reduction target and strategy from Higher Education in England: a report to HEFCE' (SQW Energy, SQW Consulting, July 2009).

project will capture all the information on the University's energy management, which will support the CRC energy efficiency submission (University of Leeds, 2011). Some of the common higher education carbon management initiatives are considered in more detail in the following paragraphs.

4.1. Energy efficiency and renewable energy migration. As part of the Green Building Projects in many United Kingdom universities, universities have invested in clean and energy efficient technologies. This enables universities to use less energy to provide the same service. Projects being undertaken amongst many universities including the University of Leeds include the placement of external lights fitting with energy efficient LED floodlighting; installing of presence detectors in cellular office and corridors and replacement of boilers (University of Leeds, 2011).

Renewable energy technologies have been proven to reduce carbon emissions drastically. Renewable energy including solar and wind can be installed both on and off site. Although renewable energy technologies can be costly, universities in the United Kingdom have gone ahead with investments in such. For example, the University of Leeds has invested substantially on renewable energy technologies that include photovoltaic panels at various on campus buildings. These panels are able to generate at peak 13Kw (University of Leeds, 2011). The University of Nottingham together with the United Kingdom government have implemented the Renewable Heat Obligation, which includes wind projects, photo-voltaics (PV), biomass and solar water heating schemes (University of Nottingham, 2010). Future initiatives include the lake source cooling and ground source heat pumps which will provide low carbon emission (Ibid).

4.2. Behavioral change and new ways of working. Higher education institutions are a valuable asset, which is able to play an important role in changing and encouraging not only students but also staff members' behavior towards how they use electricity and other sources of energy. There are many universities that have initiatives that intend to change students and staff members' behavior. The University of Birmingham has been on its fourth year journey on the student switch off initiative. This initiative encourages students to save energy around their surroundings. This includes switching off lights and appliances, putting lids on pots while cooking, not overfilling the kettle. This initiative saved about 200 tonnes of carbon dioxide in the 2009/10 financial year (University of Birmingham, 2010). The University of Leeds has an active behavioral awareness campaign that targets all new students with a Green Guide and Students Environmental Representative in Residences (University of Leeds, 2011).

Table 2 presents the Manchester Metropolitan University carbon journey from 2005-2014, which highlights some initiatives taken to reduce carbon emission from operations like installations in new buildings.

Table 2. Manchester Metropolitan University on its carbon journey 2005-2014

Year	MMU's Carbon journey 2005-2014
2005	MMU stops using oil in boilers and converts to gas – a much lower carbon fuel.
2006	Decision is taken to form an Environment Team and set MMU on a path to using natural resources more efficiently.
2007	Display energy certificated created for all MMU buildings.
2008	Manchester's second largest panel array installed on NMM roof. The first of Big Student Switch off of sees students in halls reduce electricity consumption by 8.4%. Lawrence Building refurbished to be twice as efficient.
2009	A £650K Revolving Green Fund created to invest in energy saving projects – with the saving used for further carbon saving measures. All buildings at Crewe Impact launched with the first staff Christmas energy shutdown
2010	Space Optimization programme launched opening times for most building. PC power management software installed in 6000 computers. Building Management Systems installed across Crewe site and new lighting in three buildings. New Exercise and Sport Science center opened as Crewe with solar water heating and rainwater harvesting.
2011	Revolving Green Fund hoped to be recycling £10, 000 per month back into energy saving project. Closure of the Alsager campus with all activities relocated to Crewe. New Business School complete enabling fit out in preparation for staff and students to move out of Aytoun campus in 2012.
2012	New Art and Design building opens with solar thermals panels and grey water recycling. Re-cladding of Chatham Tower and double glazed window will make the building four times more thermally efficient.
2013	Eco-Campus environmental management system in place across MMU. Electrical load sheading planned for introduction at times when demand on the nation grid is high.
2014	Birley Fields Campus complete with the target of being Zero Carbon Water, Zero Waste. MMU Birley Fields Combined Heat and Power Energy Center and District Heating Network planned to come online. Staff and students move into the new Birley Fields campus. The Didsburg and Elizabeth Gaskell campuses are closed.

Source: Manchester Metropolitan University (2011, p. 2).

5. Carbon management in South African higher education

This section will discuss carbon management practices from South Africa Higher Education Institutions and compare this journey to the higher education institutions in the United Kingdom. Globally, South Africa is considered the 13th largest GHG emitter and the largest emitter in Africa (Boden et al., 2011). This means that South African entities, including the higher education sector need to do something and play a critical role in reducing the country's GHG emissions.

The South African government has put relatively good carbon management policy instruments in place. However, these are still in their infancy stages. Hence there is still much to do from the national level. Clarity from the national carbon management policies will serve as a catalyst for higher education and other stakeholder institutions to align or integrate their energy policies to contribute to the national level targets. Although the government came up with carbon reduction targets from the Copenhagen Climate Summit in 2009, these are yet to be translated into sector targets. Since the Copenhagen Climate Summit much has been done by different governmental sectors and the following polices are testimonies: South Africa National Development Plan Vision 20130 (2011) – NDP, South Africa's National Climate Change Strategy White Paper (2011) and The Industrial Policy Action Plan II (2010).

The overall aim of the NDP is to transit South Africa into a low carbon economy and to implement the climate policy, which will contribute to the broader census to reduce carbon emissions and to achieve the target set by the South African government (NDP, 2011). The South African government has committed itself to "reduce its emissions by 34 percent by 2020 and 42 percent by 2025" (National Planning Commission, 2011, p. 179). The NDP further spells out a number of initiatives and programmes that will help contribute carbon emission which includes: commitment to undertake mitigation actions; appropriate mix of carbon pricing mechanism; policy instruments that support mitigation; expanded renewable energy programmes; an advance liquid and bio-fuel sector; an effective mix of energy efficiency and demand management incentives; proactive local government climate change programmes in area such as waste management and street lighting; regulation to promote green buildings and construction practices to mention a few (National Planning Commission, 2011, p. 180).

In 1990, The Talloiries Declaration focusing on University Leaders for Sustainable Future was established in France following a conference. The main aim of the conference was to encourage universities to incorporate sustainability in environmental literacy, in teaching, operations and outreach. In South Africa five universities namely: Rhodes University, University of Cape Town (UCT), University of KwaZulu-Natal (UKZN), University of the Western Cape (UWC) and the University of Witwatersrand become signatories to The Talloiries Declaration. A sample of three out of the 23 South Africa universities could be drawn as these were the universities with documents readily available publicly. These universities include: the UCT, UNISA and Rhodes University. The initiatives undertaken by these universities towards carbon management are now discussed in detail in the next sub-sections.

5.1. Rhodes University. In 1996 Rhodes University became a signatory to The Talloiries Declaration. This resulted in the drafting and passing of an Environmental Policy in 1998 (Rhodes University, 1998). The main aim of the Environmental Policy was to enhance and improve environmental activities, curricula, research and community activities. The policy was further revised in 2013 and it is now called the Rhodes University Environmental Sustainability Policy (Rhodes University, 2013). The policy embraces a social ecological interpretation of sustainability where practices and actions are viewed in terms of their benefits with regards to protecting and improving the wellbeing of interacting social elements that include cultural, economic and political concerns and biophysical elements of the environment (Rhodes University, 2013). Furthermore, the university committed itself to reduce its ecological footprint in terms of infrastructural development and the use of environmental goods and services (Ibid).

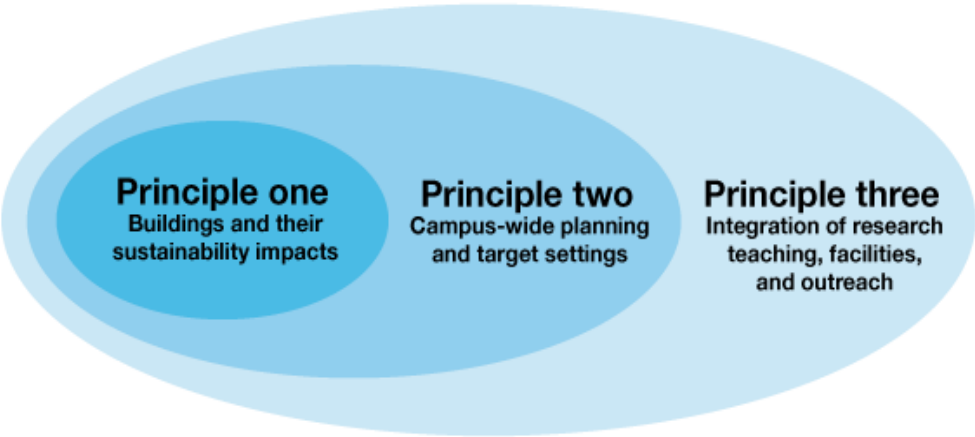
As a signatory to The Talloiries declaration, Rhodes University has embarked on a journey to reduce its carbon footprint. This is done by promoting, supporting and expanding opportunities that will reduce carbon emissions in buildings and operations (Rhodes University, 2013). In 2007 Rhodes University carried out a number of environmental audits which were aligned with various aspects of the Environmental Policy, such audits included, among them: computing, water, recycling, liquid hazardous waste, environmental policy document, energy, students' awareness and green space. Other projects in place are the Project 90:2030 that aims to reduce 90% of Rhodes University's carbon emission by the year 2030.

Apart from initiatives taken on campus, there are measures put in place, like monitoring the usage of electricity in different buildings. Old buildings have been retrofitted with low energy consuming

electricity fitting and appliances (Rhodes University, 2013). Furthermore, the Makana Wind Farm is being used to explore sustainable energy options that will enable energy efficient (Ibid). In summary, Rhodes has many visible initiatives on campus that address climate change, carbon management, electricity use and waste material.

5.2. University of Cape Town. The UCT become a signatory to The Talloiries Declaration in 1990. Since then it has made enormous progress in sustainability and later carbon management initiatives at its different campuses. In 2008, the university formed an Environmental Management Working Group (EMWG) and published the Green Campus Policy Framework (Hall and Murray, 2008). The main aim of the framework was to draw on existing initiatives, enabling an operational Green Campus Plan. The main focus of the Green Campus Plan was to reduce the university carbon emission with specific targets, namely been energy saving, reducing carbon emission, recycling and water conservation (Hall and Murray, 2008).

In 2011, the UCT started reporting on the International Sustainable Campus Network and Global University Leaders Forum (ISCN-GULF) Sustainable Charter terms. The intention was to add momentum towards a sustainable campus in terms of policy, practice, education and research into the institution (UCT, 2012). The ISCN nested hierarchy of principle is illustrated in Figure 1. In that same year, the UCT established the African Climate and Development Initiative (ACDI) with the aim of addressing climate change through its research, to serve society and through education.



Source: ISCN-GULF (2010, p. 3).

Fig. 1. ISCN hierarchy of principle

In terms of running projects and initiatives, the UCT has embarked on various sustainability initiatives that will enable it to focus on energy efficiency and demand reduction. In order to accomplish these goals, there were installations of web-based electricity meters on the main campus and the Health Science Campus in 2011 (UCT, 2012). This initiative allowed the identification of substantive uses and informed demand reduction strategies. Furthermore, there were installations of solar water heating facilities at selected residences and data on the quantity of renewable energy has been produced over the past years but is not yet available (Ibid). In 2009, the UCT embarked on the Green Cleaning Initiative (GCI). The main focus of the GCI is the sustainable re-use, donations, material recovery and safe disposal of waste. All this has led to the initiative to develop a Green Procurement Policy (UCT, 2012). The sustainable design of buildings is yet another focus at the UCT, with the implementation Environmental Management Plans for new building within different campuses (UCT, 2013). Table 3 presents a summary of different initiatives undertaken by the UCT in order to reduce its carbon footprint.

Table 3. UCT's principle 1 goals

Topics	Goals and initiatives		Results	
	Objective and targets (for reporting year and/or planned for the following and beyond)	Key initiatives in reporting year and/ or planned for the following and beyond)	Performance 2010	Performance 2011
Electricity	Energy efficiency reduction of 10% against 2007 by 2014	Establish baseline; fluorescent lamp refit; and installation of web-based digital metering	Total kWh/a: ~63500000 Digital meters installed on Health Sciences Campus at transformers	Total kWh not available 33 digital meters installed on Main Campus

Table 3 (cont.). UCT's principle 1 goals

Topics	Goals and initiatives		Results	
Green building practices	Achievement of minimum standards of best practice, 4-Star Green Star SA for all new buildings and major refurbishments	Detailed design investigations undertaken for new Engineering Building to achieve 4-Star certification; University Council adopted a policy of minimum 4-Star Green Star SA rating in June 2012	N/A	Design of the new engineering building was optimized for energy efficiency, thermal comfort through energy modelling and façade design

Source: UCT: ISCN-GULF (2012, p. 9).

Long term sustainability at the UCT includes a campus-wide master planning and target setting (UCT, 2013). This witnessed initiatives that started measuring the carbon footprint. The UCT carbon footprint was undertaken by the Energy Research Center in the Engineering faculty and later transferred to the Information System Department (UCT, 2012). The performance results are shown in Table 4. Systems have been set up for updating of measuring and documentation of the UCT's carbon footprint. In 2009 the UCT completed its first carbon footprint study and became the first university in South Africa to do so (Letete et al., 2011). The university started its journey to measure carbon in 2007 and a figure of about 83,400 tonnes of carbon dioxide equivalence (CO_2eq) was recorded. The UCTcampus energy consumption and transportation contributed up to 81% and 18% of the footprint respectively. Furthermore, the electricity consumption in that same year contributed about 80% of all the emissions associated with university activities (UCT, 2012).

Table 4. UCT's principle 2 goals

Topic	Goals and initiatives		Results	
Priority topic	Objective and targets	Key initiatives	Performance 2010	Performance 2011
GHG reduction	Calculate annual GHG emission and set reduction targets	Institutional arrangements and information systems for on-going reporting of GHG emission are in the planning stage	Baseline established: 83,400 Tons CO_2 eq total CO_2 emissions for 2007	To be updated in 2012/2013

Source: UCT: ISCN-GULF (2012, p. 10).

5.3. University of South Africa (UNISA). In 2007 the University of South Africa (UNISA) became the first South Africa university to become a signatory to the United Nations Global Compact (UNGC). The UNGC has ten governance principles addressing human rights, labour, anti-corruption and environment concerns (UNGC, 2012). UNISA strives to abide with and advance the UNGC ten principles. The ten principles are closely aligned with an UNISA's 2015 strategic plan, which UNISA has committed itself to be a leader in sound corporate governance and the promotion of sustainability.

Through such pledges, UNISA has embarked on climate/sustainability initiatives that will show the university's commitment to environmental complexities (UNISA, 2011). Many of the initiatives are still in their infancy stages but some are already running. One of the planned initiatives is to reduce the university's carbon footprint by managing, among other activities: (1) travel; (2) electricity; (3) water; and (4) paper usage. The main purpose of these initiatives was to consider the institution's carbon footprint holistically and identify reduction and mitigation strategies that can be applied (UNISA, 2011).

UNISA approved its first Environmental Sustainability Policy (UNISA, 2012). The main aim of the document was to foster sustainable living practices and address environmental challenges in everyday core business. In 2012, UNISA performed its first carbon footprint (UNISA, 2012) that reported on Scope 2 and 3 categories of emissions. The year 2011 was used as a baseline to calculate the carbon footprint for electricity usage.

In 2013, the UNISA Management Committee (MANCOM) approved the Green Economy and Sustainability Engagement Model (GESEM), with the aim of enhancing and branding the university as a true green economy and sustainability leader amongst South Africa Higher Education institutions (UNISA, 2013). In June 2013, the GESEM team partnered with the Department of Environmental Affair to raise awareness amongst students, staff members and the broader UNISA community on the need to lower carbon emission. This initiative was undertaken through bringing Zero Carbon Emissions Electric Vehicles for the first time in Africa to an institution of higher education. Four Zero Carbon Emissions Electric Vehicles (Nissan Leafs), the only one in Africa by then spend the entire day on Unisa main campus in Pretoria (Figure 2).

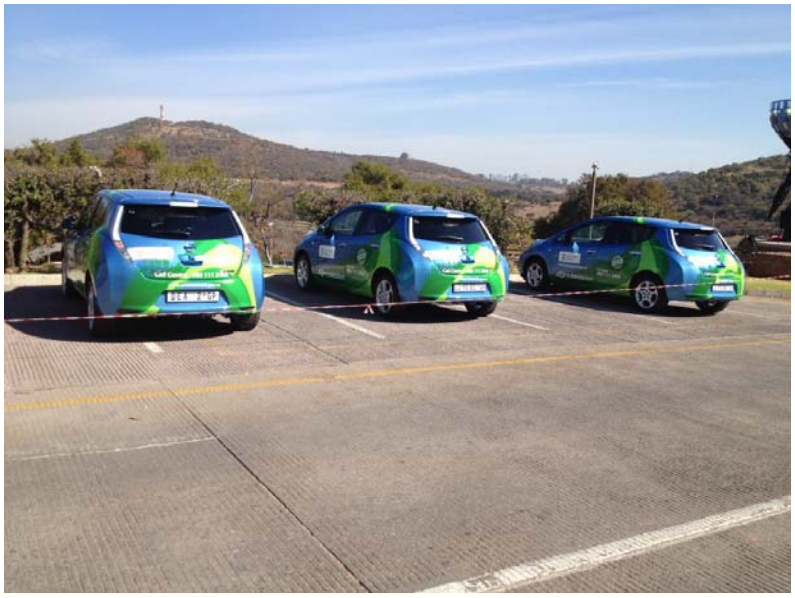


Photo by: Godwell Nhamo.

Fig. 2. Zero carbon emissions electric cars at UNISA

The initiatives discussed from the three universities show clearly that something is happening in the South African higher education institutions with regards to carbon management.

Conclusion

Higher education has a critical role to play in society by addressing climate change and finding solutions to this global challenge. The main purpose of this paper was to document carbon management strategies adopted by higher education institutions in the United Kingdom and in South Africa. The key finding is that Although South African higher education institutions still lag behind with regards to the development of carbon management strategies and involvement of many universities, there are initiatives that compare favourably to those in the United Kingdom. Universities including the University of Cape Town, Rhodes University and the University of South Africa are leading in this regard. There is also a high need that South African Institute of higher education start investing in green architecture, migration to renewable energy and energy efficiency technology. This is despite the early high capital investment in such initiatives. Although it has been argued that the initial capital outlays for renewable energy and energy efficient technology is high, returns may be realized in the third and fourth years if managed well. Above all, reducing harmful GHG emissions by universities across the word should be part of doing what is right – good environmental stewardship that saves the planet.

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