



UNIVERSITY OF SOUTH AFRICA

**Towards environmental sustainability:
An assessment of Unisa's carbon footprint and appropriate
mitigating actions**

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Assurance

April 2012

Table of contents

1	Introduction	4
1.1	Background	4
1.2	Purpose of the assessment	5
2	Definition of key terms and variables.....	7
2.1	Carbon	7
2.2	Carbon footprint.....	7
2.3	Carbon Offsets	7
2.4	Carbon foot print calculator.....	7
3	Assessment of Unisa’s total carbon footprint for scope two and three	8
3.1	Assessment of total carbon footprint for electricity usage	8
3.1.1	Mitigations actions	9
3.2	Carbon footprint for paper usage	9
3.2.1	Mitigations actions	11
3.3	Carbon footprint for domestic and international air travel	12
3.3.1	Mitigations actions	13
3.4	Carbon footprint for Unisa Fleet.....	13
3.4.1	Mitigations actions	14
4	Summary of Unisa’s carbon footprint	14
4.1	Summary of the mitigation actions	16
5	Conclusion	17

List of tables

Table 1: Carbon footprint for Electricity	8
Table 2: Course enrolments per College - 2007 to 2010.....	10
Table 3: Paper consumption 2011.....	10
Table 4: Carbon footprint for paper usage.....	10
Table 5: Paper wastage per Department.....	11
Table 6: total funds recovered via waste paper	11
Table 7: Carbon footprint for domestic and international travel	13
Table 8: Carbon footprint for Unisa Fleet	14
Table 9: Total carbon footprint for Unisa	15
Table 10: Carbon Neutral Action Plan	16

Table of figures

FIGURE 1: UNISA'S CARBON FOOTPRINT	5
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1 INTRODUCTION

1.1 Background

The purpose of this report is to foreground Unisa's commitment to establishing itself as a leader in sound corporate governance and promotion of sustainability. Unisa's vision "Towards the African University in the service of humanity" is buttressed by its commitment to the UNGC and the King III Code of Governance principles in terms of promoting sustainability and governance in every aspect of the University work and set them on top of the institutional priorities. This is informed by *Goal 6, Strategy 6.1* in the Institutional Operational Plan (IOP). Unisa annually submits a Communication on Progress (COP) report to the United Nations Global Compact (UNGC), as part of its adherence to the set principles in the compact, being Human Rights, Labour standards, Environment and Anti-Corruption.

According to the UNGC, the recent submission of Unisa 2011 COP report has met all the minimum requirements and now qualifies for the Global Compact (GC) level. The Global Compact level would require Unisa to improve policy implementation and increase transparency in order to progress toward achieving GC Advanced status for the next reporting period. Moreover, for reporting at GC advanced status, Unisa would have to demonstrate that it has adopted, and will report on, policies and processes in the following areas:

- strategy, governance and engagement
- UN goals and issues
- implementation of Global Compact principles
- value chain implementation
- verification and disclosure

The introduction of the carbon footprint assessment demonstrates a serious commitment towards environmental sustainability to positively impact on the triple bottom line of Unisa.

The assessment outcomes for 2011 reveals that the electricity consumption produced the largest amount of carbon (89%) followed by paper usage (6%), and various forms of travel (5%). If the university were to consider planting of trees as a mitigation measure to offset the carbon impact 161 497 trees would be required.

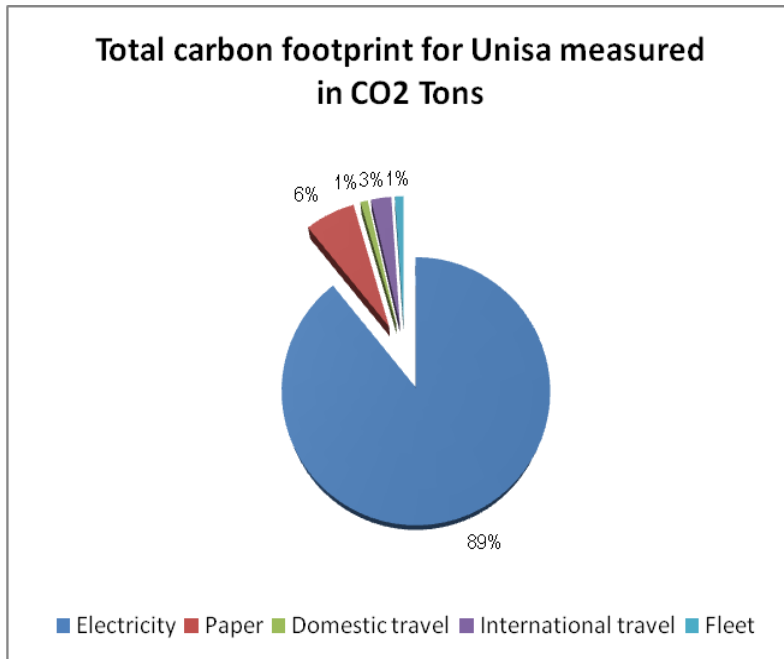


FIGURE 2: UNISA CARBON FOOTPRINT

In analysing sustainability reports of a number of higher education institutions in the USA, it became clear that universities make use of a number of alternatives to mitigate their carbon footprint. Universities should allow for mitigations actions that are in support of its core education processes.

1.2 Purpose of the assessment

The purpose of assessing the carbon footprint is to demonstrate Unisa's commitment in the form of reporting together our carbon impact. The impact comes with an institutional responsibility towards all stakeholders to define mitigations actions and ensure its integration into the institutional planning and reporting processes of the university.

The risk associated with the assessment is that the data becomes public knowledge necessitating Unisa to act responsibly and diligently. This analysis puts Unisa within the public eye. The issue is then what role can Unisa play in protecting the environment against the activities performed by its staff members in carrying out its mandate.

For this reason, mitigation actions have been defined within the context of the Higher Education environment and could range from institution wide actions such as better technological processes and systems, investment in clean energy initiatives to offset the carbon emissions, encourage staff to use video conference facilities where necessary, planting of trees, and making donations to carbon neutral projects. On the academic front, it is important to integrate identified actions with teaching and learning research and community engagement. The aim is not to quantify a rand for rand reduction in carbon but rather to influence behavior through moving towards online delivery model, technology enhanced student support services, research on carbon, community engagement projects and short learning programs that will impact on the livelihood of the communities.

The calculation of carbon footprint has been divided into the following three categories:

- Category one, is normally building related sources such as energy emissions from the buildings etc.
- Category two, involves activities used by the institution but obtained from other parties such as buying of electricity from Eskom etc.
- Category three includes those activities performed by the institution which directly have a negative impact on the environment. For example, travel, paper consumption, staff members or student undertaking international trips etc.

In analysing the content of each category, it is evident that Unisa can only focus on category two and three for the assessment. The reasons being that our buildings are closed loops (i.e. they do not emit CO₂ gases like factories), as per category one would require open loop buildings. Therefore, the assessment provides a total carbon footprint for electricity and water consumption, paper usage, domestic and international air travel and Unisa's fleet. As an entry point into this new field of interest, Unisa has adopted a free source calculator from the Food and Trees for Africa (FTFA) to do some of the assessment for domestic and international air travel and electricity consumption. Once this initiative is widely accepted and integrated as part of corporate reporting, Unisa might want to consider a more formal approach to calculate the carbon impact. The objective of this exercise is also to raise awareness and change behaviour of staff and students by creating an environment which promotes carbon management and encourages everyone in the University to play their part in reducing the University's carbon impact. In principle, the success of this endeavour is not to be found only in either technology or administrative directives, but in individual understanding and personal commitment.

2 DEFINITION OF KEY TERMS AND VARIABLES

The following key terms and the variables form the basis of the assessment

2.1 Carbon

Carbon is Nature's building block. Everything that grows is built out of carbon. It is also stored in great quantities in all fossil fuels. When carbon is in its solid form, as in a tree trunk or a vein of coal in the ground, it is harmless, and in fact profoundly helpful and supportive of life as we know it. When these sources of carbon are burned, it is transformed into a gas known as carbon dioxide or CO₂. Increasing accumulations of CO₂ in the earth's atmosphere coupled with increasing emissions of other green house gases is responsible for the global warming crisis we now face as a global community (Las Gaviotas, 2011).

2.2 Carbon footprint

The term carbon footprint refers to the amount of carbon (CO₂) we emit individually or institutionally (Las Gaviotas, 2011). CO₂ is produced from many sources. It is the primary gas responsible for Global warming and the resulting alarming changes in the climate. Nearly everything done in the modern society requires energy. This energy is generated primarily by burning fossil fuels.

2.3 Carbon Offsets

This is the act of reducing an equal amount of carbon somewhere else to counterbalance the carbon emission from energy-using activities. (www.carbonfund.org).

2.4 Carbon foot print calculator

The FTFA carbon calculator, the first South African calculator of its kind, uses the Global Greenhouse Gas (GHG) Reporting Protocols which aim to harmonize GHG accounting and reporting standards internationally to ensure that different trading platforms and other climate related initiatives adopt consistent approaches to GHG accounting.

3 ASSESSMENT OF UNISA'S TOTAL CARBON FOOTPRINT FOR SCOPE TWO AND THREE

3.1 Assessment of total carbon footprint for electricity usage

The year 2011 was used as baseline for this assessment. The electricity bills of account for all Unisa's buildings were used to calculate the total amount of carbon produced in KW/H.

TABLE 1: CARBON FOOTPRINT FOR ELECTRICITY

Unisa Buildings	Electricity consumption kw/h	Electricity CO2 Tons						Actual electricity expenditure 2011
		Average Monthly Consumption [kWh] ¹	Annual Consumption [kWh]	CO2 tons	C [kg]	GECs	No of Trees	
Unisa main campus and Sunnyside	33,328,201	2,777,350	33,328,200	34,328,047	9,362,195	33,820	91,313	R 36,992,235.49
Florida	15,715,550	1,309,629	15,715,548	16,187,017	4,414,641	15,947	43,058	R 7,114,984.64
Polokwane	242,706	20,226	242,712	249,987	68,178	246	665	R 373,187.63
Nelspruit	196,196	16,350	196,200	202,082	55,113	199	538	R 293,164.67
Johannesburg	1,858,417	154,868	1,858,416	1,914,170	522,046	1,886	5,092	R 3,386,060.10
Cape town	175,980	14,665	175,980	181,259	49,434	179	482	R 287,966.14
KZN	557,447	46,454	557,448	574,170	156,592	566	1,527	R 478,926.46
Rustenburg	95,066	7,922	95,064	97,918	26,705	97	261	R 93,000.56
Port Elizabeth	77,908	6,492	77,904	80,245	21,885	79	214	R 87,000.64
Kroonstad	31,176	2,598	31,176	32,111	8,758	32	86	R 36,000.93
Bloemfontein	174,720	14,560	174,720	179,962	49,081	177	479	R 278,144.22
Mafikeng	120,192	10,016	120,192	123,798	33,763	122	329	R 245,321.16
East London	67,799	5,650	67,800	69,833	19,045	69	186	R 67,000.20
Mthatha	108,278	9,023	108,276	111,526	30,416	110	297	R 213,321.60
Total	52,749,636	4,395,803	52,749,636	54,332,125	14,817,852	53,528	144,524	R 49,946,314.44

Electricity consumption at Unisa is the first biggest contributor to Unisa's total carbon footprint. The estimated total carbon footprint for all Unisa's buildings electricity was 54,332,125 (CO₂) Tons and the total electricity cost associated with this was R 49,946,314.44.

¹ From July 2011 to Dec 2011 the municipality only provided estimates of the main campus. Therefore the kw/h for the months of April, May and June were used to calculate an average of 2,542,575 KW/h for the rest of the months that followed. The buildings in Kimberley and Potchefstroom is rented and thus included in the rent.

3.1.1 Mitigations actions

As a higher education institution, Unisa could consider the following short to medium terms mitigation actions to offset the amount of carbon produced based on the total costs of electricity usage.

- Obtaining Sustainable Energy Certificates (SEC's). Eskom electricity is mostly from coal-fired and therefore has a serious impact on the environment. The green power producers supply electricity into the Eskom grid. Buying a green energy certificate will assist in supporting the additional cost of the environmentally friendly energy. In exchange Unisa can claim the power that was produced into the grid and be guaranteed that Unisa's energy is carbon free (Sustainable Energy Certificate (1 SEC = 2.7 Trees)).
- Produce at least three research outputs on green power;
- Launch a "Turn Off" awareness campaign as part of an integrated conservation awareness program.
- Develop an Energy Information System to provide information per building and regional office. Publicly announce monthly consumption on the internet;
- Prohibit the purchase of new, non-energy efficient systems (appliances/controls) and replace existing non-energy efficient systems.
- Investigate the use of solar power at all parking lots and new buildings
- Collaboration with Unisa and industry to evaluate the latest technologies and solutions for campus energy generation.

3.2 Carbon footprint for paper usage

For paper usage, Unisa looked at the total costs/quantity of paper ordered or purchased for 2011 and translated the costs/quantity into the amount of carbon produced and the number of trees required to produce one module.

As an open distance learning institution, Unisa consumed 835,888,374 sheets of paper. This is a result of Unisa delivery model that is primarily paper based with a total course enrolments of 1 339 174 in 2010 academic year. An annual percentage increase of 9% contributes to the higher consumption of paper.

TABLE 2: COURSE ENROLMENTS PER COLLEGE - 2007 TO 2010

Colleges	2007	2008	2009	2010	Annual % increase in course enrolments
CAES	19 308	23 969	24 937	31 615	18%
CEMS	525 228	578 146	542 941	573 916	3%
CEDU	93 155	125 070	155 616	176 901	24%
CHS	160 894	181 226	207 655	245 474	15%
CLAW	167 331	170 116	177 301	193 383	5%
CSET	75 809	101 473	108 117	117 795	16%
CGS	65	100	75	90	11%
Total	1 041 790	1 180 100	1 216 642	1 339 174	9%

The paper usage at Unisa is the second largest contributor of carbon footprint with a total of 835,888,374 tons of paper used and the total costs amounting to R51,220,505,31 for the year 2011. The total number of modules for which paper was utilised was 2794. The move towards on line delivery will definitely impact on the consumption. The change in Unisa business model in itself becomes a mitigation action and it is therefore important to understand the impact of the shift toward online delivery on Unisa carbon. To this end Unisa paper consumption destroys approximately 9512 trees.

TABLE 3: PAPER CONSUMPTION 2011

Modules printed (2794)	No of sheets	No of Reams	Rand value
Study Guide	342,915,819	685,832	R 14,515,891,20
Tutorial Letter	333,292,146	666,584	R 11,539,979,85
General Printing	159,680,409	319,361	R 25,159,512,21
Total	835,888,374	1,671,777	R51,220,505,31

TABLE 4: CARBON FOOTPRINT FOR PAPER USAGE

Reams/quantity		Weight(CO ₂) Tons	No of Trees
Average Monthly	Annually		
139315	1,671,780	3,845.09	9512

In South Africa, paper production is done via dedicated forests owned and managed by the paper and pulp manufacturers. Paper manufacturer's plant on average three trees for every tree cut down. The trees versus paper calculation are therefore not based on the amount of trees that are cut down to produce paper, but the amount of CO₂ emitted during the production of the paper. **The amount of carbon footprint produced for the paper usage by Unisa was 3,845.09 CO₂ (Tons).** The total expenditure for the amount of paper purchased in 2011 amounted to R51, 220, 505, 31.

In 2009 Unisa evaluated the redundant stock and paper wastage, as stated in a memo dated 6 January 2010, reference 001/2010. Upon request for the 2010 and 2011 data DSPQA was informed that the estimated value for despatch was R23 million in 2011. This provides evidence that the trend as reported in 2009 remains valid. Table 5 provides the data for the 2009 calculation and indicates that Despatch contributes to 99% of the total value.

TABLE 5: PAPER WASTAGE PER DEPARTMENT

Departments	Value of redundant stock	% of total value
Despatch	R27,484,450.35	99.2%
Central Store Florida	R 78,175.81	0.3%
Central Store Pretoria Media	R 109,664.27	0.4%
Central Store Pretoria Stationery	R 32,007.55	0.1%
Alumni	R 1,380.00	0.0%
Library	R 1,553.63	0.0%
Total	R27,707,231.61	100.0%

Through the recycling initiative Unisa recovered R2.4 million in 2010. This is a result of dedicated processes, improved awareness raising and commitment towards recycling. Although immensely important the recycle initiative alone will not offset the amount of carbon footprint produced.

TABLE 6: TOTAL FUNDS RECOVERED VIA WASTE PAPER

	2005	2006	2007	2008	2009	2010
Florida	143,512.70	107,035.00	175,663.50	122,535.00	163,407.30	148,260.00
Regions	2,875.50	412.50	0.00	9,114.75	13,665.95	62,004.00
Pretoria	950,328.70	1,014,894.50	498,482.10	395,508.75	665,295.25	2,286,981.50
Total	1,096,716.90	1,122,342.00	674,145.60	527,158.50	842,368.50	2,497,245.50

The biggest challenge in terms of paper is to optimise the production and consumption of printed resources. This is demonstrated in 2009 where the total amount of waste of R27 million is offset by less than R1 million. It is clear that the paper that is being purchased is not being utilised optimally and efficiently by the university.

3.2.1 Mitigations actions

To offset the carbon emission in the consumption of paper, Unisa could consider the following medium to long-term actions:

- The development of a Just in time (JIT) production process and plan in line with the revised PQM by reducing in-process inventory and associated carrying costs.
- A structure plan towards online delivery would offset carbon emission. An analysis was conducted to determine the saving in paper, if Unisa introduce full online delivery for a number of modules per annum. In order to calculate the number of trees used to produce one module Unisa sourced the number of trees used per ream. The table below illustrates that one module uses approximately 2.8 trees.

Modules	Consumption of sheets	No of modules offered	No of sheets per module	No of reams per module	Weight(CO2) Tons	No of Trees
Study Material	676,207,965	2,794	242,021	484	1.10	2.8

- Moving towards less colour printing, as the latter produces carbon in the process of recycling.
- Moving towards full scale on screen assessment practices;
- Full scale centralised printing to minimise the amount of printing
- Unisa already make use of recycled paper and this should be incorporated into the aforementioned integrated conservation awareness program.

3.3 Carbon footprint for domestic and international air travel

The University is currently making significant strides in reducing its carbon footprint and is investigating the possibility of working on innovative solutions to decrease the carbon emissions in areas such as travel conducted by colleges, staff and students. Unisa is a global university and taking cognisance of the nature of its academic activities and the geographical footprint of the students, it would be difficult to discourage both the student and staff from travelling. Therefore, there is a need to have a carbon neutral action plan as part of the university moral responsibility.

Domestic and international air travel contribute 3% towards the carbon footprint and this is due to management attending to office business and staff attending and presenting papers at local and international conferences, conducting research and community engagement.

Table 7 below presents information on the total carbon footprint produced by Unisa, for both domestic and international travelling, from January 2011 to December 2011 and is based on industry norms and standards provided byTWF.

TABLE 7: CARBON FOOTPRINT FOR DOMESTIC AND INTERNATIONAL TRAVEL

Category	Distance travelled	Emission Factor	Total Sum of CO ₂ Tons	Total C kg	No of Trees
Domestic Air Travel (Dom)	4310692	0.13	560,389.960	152,833.63	1,528
International Air Travel (Int)	13939675	0.11	1,533,364.250	418,190.25	4,182
Grand Total	18250367		2,093,754.210	571,023.88	5,710

The total carbon for domestic and international air travel were 560,389,960 and 1,533,364,250 CO₂ tons, respectively. The grand total for both domestic and international air travel was 2,093,754,210 CO₂ tons for 2011. Using the calculator, the number of trees required to offset this carbon footprint is 5710 trees.

3.3.1 Mitigations actions

- Unisa needs to incorporate carbon neutrality and sustainability within the curriculum and educational experience for all staff and students;
- Coordinate and expand research on climate change and efforts necessary to achieve carbon neutrality.
- Improve the access and availability of video conferencing capabilities to reduce travel e.g investment in central multimedia facility in each building.
- There is a need for behaviour change in both academic and non academic departments to reduce demands place on utilities.

3.4 Carbon footprint for Unisa Fleet

Unisa fleet produces emissions by staff undertaking official trips for purpose of teaching and learning, research and community engagement and represent a small component of the total carbon footprint of the University. As with all the other categories Unisa has to manage competing values. Unisa has to sustain its core educational processes whilst managing cost and the overall impact on the local community.

According to table 8, the carbon footprint for Unisa fleet in terms of both petrol and diesel engine was 436,698 CO₂ tons and 221,469 CO₂ tons, respectively, with a total of 658,194 CO₂ tons. The total distance travelled for petrol and diesel in 2011 was 2675268 km. Using the calculator, the number of trees that Unisa could consider planting to offset the amount of carbon produced is 1751 trees.

TABLE 8: CARBON FOOTPRINT FOR UNISA FLEET

Size of the car	Total km travelled per year	Total CO ₂	C [kg]	No of Tees
Petrol - Small car up to 1.4 litres	8,878	1,606	438	4
Petrol - Medium Cars 1.4 - 2.	1,217,061	260,329	70,999	693
Petrol - Lager than 2 litres	590,816	174,763	47,663	465
Diesel - Lager than 2 litres	858,513	221,496	60,408	589
	2,675,268	658,194	179,508	1,751

3.4.1 Mitigations actions

- Improve the access and availability of video conferencing capabilities to reduce travel e.g investment in central multimedia facility in each building;
- Consider partnerships with organisations such as Food and Trees for Africa on selected community engagement initiatives;
- Encourage the use of public transport by staff members and consider subsidising staff lift clubs.
- Provide discounted parking for staff within lift clubs
- Restructure and coordinate the fleet schedules and administration to reduce single occupancy car use;

4 SUMMARY OF UNISA'S CARBON FOOTPRINT

Managing and reducing CO₂ emissions as part of a broader sustainability plan for the University is primarily centred on efficiency and conservation, and has categorised relevant actions into three broad categories:

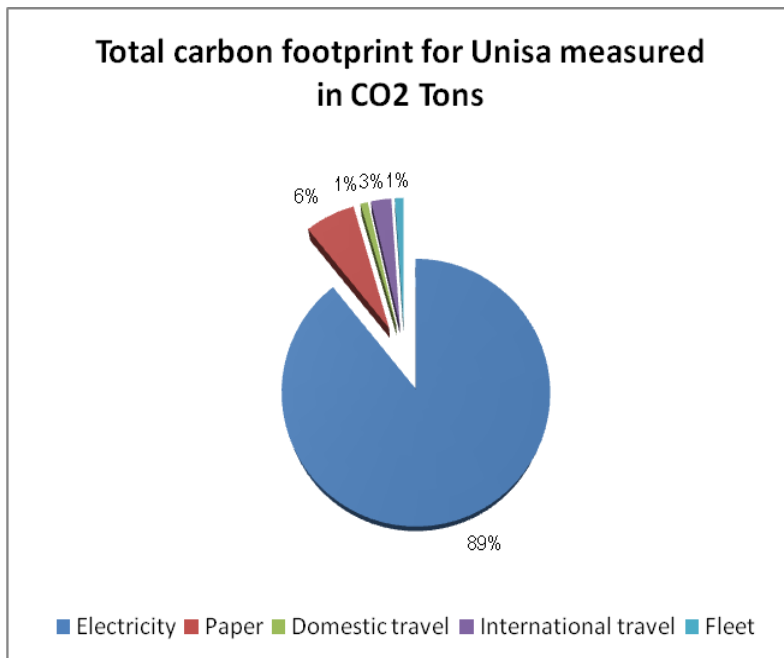
- Increased transport efficiency
- Reducing paper usage
- Increased efficiency of electricity production

The total carbon footprint produced by Unisa on electricity consumption, paper usage, domestic and international air travel as well as Unisa fleet has been calculated at an estimated amount of 60.923,163 CO₂ tons.

TABLE 9: TOTAL CARBON FOOTPRINT FOR UNISA

Categories	CO2 Tons	C kg	No trees
Electricity	54,332,125	14,817,852	144,524
Paper	3,845,090	1,048,661	9,512
Domestic travel	560,390	152,833	1,528
International travel	1,533,364	418,190	4,182
Fleet	658,194	179,508	1,751
Total	60,929,163	16,617,044	161,497

Electricity consumption produced the largest amount of carbon (89%) followed by paper usage (6%), and various forms of travel (5%). If the university were to consider planting of trees as a mitigation measure to offset the carbon impact 161 497 trees would be required.



Global emissions are increasing at a fast pace. In analysing sustainability reports of a number of higher education institutions in the USA, it became clear that universities make use of a number of alternatives to mitigate their carbon footprint. Universities should allow for mitigations actions that are in support of its core education processes.

The relevant strategies recommended below are proposed as a way of moving towards a carbon neutral university.

4.1 Summary of the mitigation actions

In the process of developing the mitigation strategies to reduce Unisa’s carbon footprint, it would be imperative to weigh the costs and benefits against the commitments made to the UNGC and its obligation towards corporate reporting as stipulated in the King III Code of Governance.

There is a need for a radical conservation programme and plan on the part of the university to change behaviours and attitudes of staff and students on environmental matters. Carbon offsets must remain an important element due to the large amount of emissions from electricity, paper usage and travel. The following table below present the recommended actions:

TABLE 10: CARBON NEUTRAL ACTION PLAN

Short-Term	Medium-Term	Long-term	Ongoing
Launch a conservation awareness program <ul style="list-style-type: none"> • “Turn Off” awareness • Recycling • Continuous communication • Identified behavioural change events • Encourage the use of public transport 	Produce at least three research outputs on green power	Obtain a Sustainable Energy Certificate (SEC’s)	Prohibit the purchase of new, non-energy efficient systems (appliances/controls) and replace existing non-energy efficient systems
Retain centralised printing and minimise colour printing	Develop an Energy Information System to monitor the usage and improve reporting	Collaborate with industry to evaluate the latest technologies and solutions for campus energy generation	Coordinate and expand research on climate change and efforts necessary to achieve carbon neutrality
Improve the access and availability of video conferencing capabilities to reduce travel e.g investment in central multimedia facility in each building	Investigate the use of solar power at all parking lots and new buildings	Develop a structured plan towards undergraduate online tuition including assessment	Partner with organisations such as Food and Trees for Africa on selected community engagement initiatives
Subsidise staff lift clubs through providing parking discounts	Amend corporate policies, procedures and processes to account for reductions in the carbon footprint	Develop a Just in Time (JIT) print production process	Monitor the carbon footprint (baseline 2011) and celebrate successes
Restructure and coordinate the fleet schedules and administration to reduce single occupancy car use	Adjust Unisa internal systems to accurately reflect CO ₂ usage and influence service providers to include CO ₂ usage on all statements		

A communication plan is essential to the implementation of these actions hence continued encouragement from the Vice Chancellor will provide compelling support for staff and students to pursue the implementation of these actions.

5 CONCLUSION

It is evident that there is a need for Unisa to consult with all relevant stakeholders to develop a framework for the implementation of an environmental strategy that will give effect towards a carbon neutral university. It is important for Unisa to think first in terms of reducing its emission of CO₂. It is evident that it is not possible for Unisa to reduce its green house gases to zero. The only current way to address the issue is to offset our carbon footprint by way of implementing relevant mitigation actions.