UNIVERSITY OF CAPE TOWN CARBON FOOTPRINT REPORT 2015

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

August 2017

This is the fifth carbon footprint report of the University of Cape Town. Previous reports can be downloaded at http://www.uct.ac.za/main/explore-uct/sustainability.

KEY FINDINGS

- Emissions increased due to changing emission factors for electricity.
- Electricity consumption in kilowatt hours decreased by 1.2%.
- There was a significant decrease in scope 1 due to optimization of Jammie shuttle routes.
- Efforts have been made to improve the completeness and accuracy of electricity data.
- Air Travel emissions increased by 52%, with kilometres travelled increasing by 74%.

Reporting period 2015	
Methodology	The GHG Protocol – Corporate accounting and reporting standard (revised edition). Emission factors are from the UK Department for Environment Food & Rural Affairs (Defra), except for electricity supply.
Inclusions	The entire university across all campuses and properties
Exclusions	Data required for emissions calculation is not currently available for: Scope 1 Refrigeration and air-conditioning gases Commuting – no new research undertaken; 2014 data used. Campus food vendors – no new data provided; 2014 data used.

Intensity metrics (Scope 1&2 only)	2015	2014	2013	% change 2014-2015
Gross Area	706 125	705 653	672 858	0,1%
Tons CO_2 e/m^2/annum	**0,106**	**0,098**	**0,099**	7,8%
Population - Staff & Student FTE	33 204	31 329	31 041	6%
CO_2 e/person/annum	**2,25**	**2,21**	**2,15**	1,7%

The importance of the grid emission factor

The Grid Emission Factor is the total amount of greenhouse gases emitted per unit of electricity generated for and distributed by an electricity grid. South Africa has a carbon intensive grid and therefore efforts to reduce electricity consumption not only save money but also significantly reduces the university's carbon footprint. As more renewable energy enters the electricity mix the grid emission factor will change.

Electricity use is a major component of the UCT carbon footprint, typically around 75%. The calculation of UCT's 2014 carbon footprint used an emission factor, generated by an industry partnership, that attempted to calculate a more accurate number: 0.94 $kgCO_2e/kWh$ (MAC Consulting 2013). This once-off study has not been repeated and thus the UCT 2015 footprint has opted to use the grid-emission factor published by Eskom, in line with the practice of most companies in South Africa. The higher figure of 1.03 $kgCO_2e/kWh$ paints a skewed picture which, given increased investment in lower carbon electricity generation, should decrease over time.

RESULTS SUMMARY

The total greenhouse gas (GHG) emissions recorded for 2015 are 95,564 tCO_2e using the updated Eskom emission factor of 1.03 kg CO_2e/kWh (Table 1). This is an increase of 9.2% or 8,041 tCO_2e compared to 2014. Using the previous emission factor for electricity of 0.94 $kgCO_2e$ per kWh, the total GHG emissions for 2015 would amount to 89 186 $kgCO_2e$ per kWh, an increase of 1.9% over 2014 (Table 2).

The main contributor to the increase in total emissions in Table 1 is from purchased electricity, which rose by 8.2% over 2014. However, the raw data reflects a decrease in kilowatt hours (kWh) of 1.2%. Therefore, the result is mainly due to the updating of the Eskom emission factor from 0.94 $kgCO_2e$/kWh to 1.03 $kgCO_2e$/kWh.

A major contributor to the increase in overall emissions is Air Travel, which increased by 52% or 1,368 tCO_2e. A positive trend emerging is a reduction in Scope 1 Jammie shuttle emissions of 14.4%, due to the rationalization of routes and possibly reduced usage due to closures.

In terms of the intensity of emissions (includes scope 1 & 2 only), the emissions per square metre increased by 7.75% to 0.106 tCO_2e from 0.098 tCO_2e. The total building area increased by only 0.1%. The per capita emissions increased by 1.7 % to 2.25 tCO_2e, with a 6% increase in population.

Table 1: Comparative GHG emissions tCO_2e (tonnes) – Updated Eskom emission factor (1.03 $kgCO_2e$/kWh)

CATEGORY	2015	2014	2013	% Change 2014-2015
Scope 1 Direct Emissions	**1 659**	**1 792**	**755**	**-7,4**
Jammie shuttle	861	1 006	-	-14,4
UCT vehicle Fleet	503	556	465	-9,5
LPG	160	230	289	-30,4
Diesel for generators[1]	134	-	-	-
Scope 2 Indirect Emissions purchased electricity	**72 986**	**67 436**	**65 835**	**8,2**
Electricity: Main Campus	47 862	44 219	42 583	8,2
Electricity: Medical campus	12 265	11 239	10 648	9,1
Electricity: Off Campus Residences[2]	11 065	10 139	10 729	9,1
Electricity: Graduate School of Business	1 415	1 393	1 417	1,6
Electricity: Hiddingh[3]	-	111	116	
Electricity: ICTS on Main[4]	379	335	342	13,2
Scope 3 Other Direct Emissions	**20 919**	**18 294**	**19 615**	14,3
Fuel and energy-related	581	341	409	70,3
Business travel	262	124	385	111,7
Business travel - airlines	3 996	2 628	2 021	52,0
Employee commuting	8 065	8 065	9 634	0,0
Purchased goods - Food	6 936	6 549	6 485	5,9
Purchased goods - Paper	382	305	386	25,3
Purchased goods - Water	138	139	121	-0,5
Waste	558	143	175	290,1
TOTAL emissions tCO2e	**95 564**	**87 522**	**86 205**	**9,2**

Notes to Table 1 & 2:

1. New category added for 2015 report due to power outages.
2. Floor area for residences are updated in this report for years 2013-2015. Rochester Residence electricity consumption was added; it was omitted in all previous reports as floor area was unknown.
3. Hiddingh electricity data included in Main Campus provided for 2015.
4. New category in 2015 report added as data became available.

Table 2: Comparative GHG emissions tCO2e – previous emission factor for electricity (0.94kg/kWh)

CATEGORY	2015	2014	2013	% Change 2014-2015
Scope 1 Direct Emissions	**1 659**	**1 792**	**755**	**-7,4**
Jammie shuttle	861	1 006	-	-14,4
UCT vehicle Fleet	503	556	465	-9,5
LPG	160	230	289	-30,4
Diesel for generators[1]	134	-	-	-
Scope 2 Indirect Emissions purchased electricity	**66 609**	**67 436**	**65 835**	**-1,2**
Electricity: Main Campus	43 680	44 219	42 583	-1,2
Electricity: Medical campus	11 193	11 239	10 648	-0,4
Electricity: Off Campus Residences[2]	10 098	10 139	10 729	-0,4
Electricity: Graduate School of Business	1 291	1 393	1 417	-7,3
Electricity: Hiddingh[3]		111	116	
Electricity: ICTS on Main[4]	346	335	342	3,3
Scope 3 Other Direct Emissions	**20 919**	**18 294**	**19 615**	14,3
Fuel and energy-related	581	341	409	70,3
Business Travel	262	124	385	111,7
Business travel - airlines	3 996	2 628	2 021	52,0
Employee commuting	8 065	8 065	9 634	0,0
Purchased goods - Food	6 936	6 549	6 485	5,9
Purchased goods - Paper	382	305	386	25,3
Purchased goods - Water	138	139	121	-0,5
Waste	558	143	175	290,1
TOTAL emissions tCO_2e	**89 186**	**87 522**	**86 205**	**1,9**

EMISSIONS BY SCOPE

Scope 1 emissions

Emissions from all Scope 1 activities amount to only 1.74% of total emissions (Appendix 1). The total Scope 1 emissions decreased by 7.4%, a positive trend. The Jammie Shuttle emissions decreased by 14.4%, apparently due to an initiative taken to rationalise and shorten the routes. Closures of the Shuttle during infrastructure upgrades may also be a factor. Vehicle fleet emissions decreased by 9.5%, a positive trend due to a reduction in fuel purchased. A small number of golf carts and Segway scooters were purchased for security and maintenance functions. Further investment in these electric vehicles is underway. Emissions from the use of LPG gas reduced by 30.4%, a continuing trend as heat pumps are being installed to heat hot water for domestic use.

Emissions from refrigeration gases are not accounted for as the data is not available. There is presently no inventory of refrigeration and air-conditioning units. Efforts are underway to gather this data from external service providers and include it in the 2016 Carbon Footprint report.

Scope 2 emissions

Emissions from purchased electricity increased by 8.2% over 2014 (Table 1). As stated above, the increase is mainly due to an increase in the Eskom emission factor from previous years, to align this reporting with best practice. Using the previous emission factor for electricity of 0.94 kg CO_2e per kWh, the emissions from electricity decreased by 1.2% (Table 2). A decrease in consumption was expected due to nationwide planned power outages occurring over a few months in 2015. Generators were used to provide some essential power during outages. Diesel fuel used is included in Scope 1.

An extensive roll-out of digital electricity meters at building level across Main and Medical campuses was implemented from 2014 onwards, and is now complete. The data from these meters reflected a major decrease in consumption. This result was not considered reliable, due to possible data loses during commissioning of the meters. For this reason, the municipal billing data was used for this report, except for the ICTS-on-Main property, as it was found that data was available from a separate meter. The data from digital meters will be available for the 2016 report, ensuring more robust results.

Scope 3 emissions

Scope 3 emissions increased overall by 14.3% to 20,919 tCO_2e. Of this amount, 3,996 tCO_2e is due to Air Travel, which increased by 52%. The raw data reflects an increase in kilometres travelled of 74%. The new Defra emission factor for non-UK long-haul flights, lower than the previous factor, has been applied. Reasons for this significant increase in air travel are unknown, but could reflect a data quality issue from the service provider, SA Airways. Emissions from Business Travel, comprising hired cars and staff reimbursements, increased by 111%, due to a major increase in the staff reimbursements category.

Solid waste emissions increased significantly by 290%. This activity comprises a minor portion of overall emissions[1]. A highly negative finding is that general waste to landfill increased from 440 tons to 1002 tons year-on-year. This increase is likely to be due, in part, to a different measurement methodology used by the new service provider[2]. However, audits of the bins does reveal a lack of effective separation at source on campus, requiring renewed efforts to manage and promote recycling.

Food waste has been added to the recycled waste measured, as it is now being separated at source in first-tier Residences and sent to a maggot farming facility. This is a very positive initiative as the nutrients are being recycled for use as animal feed, rather than being lost to landfill.

Emissions from the use of paper products increased by 25.3%, likely due to improved data collection.

The increase in food supply to Residences is likely due to factors arising out of deferred exams caused by protests on campus, resulting in students remaining in residence during vacation to complete the semester[3].

[1] Solid waste comprises 0.58% of total emissions.

[2] The previous 5 years of solid waste data were provided by the former service provider.

[3] Pers. Comm. Paul Marais, Catering Manager, Student Housing and Residence Life

DATA QUALITY

The quality of data for scope 1 is considered to be of high quality. Scope 2 data is medium quality given the reliance on manual data capturing of municipal bills and the large number of properties. Scope 3 can be considered to be of low quality, using an estimation approach, acceptable in terms of the GHG Protocol.

CONCLUSIONS AND RECOMMENDATIONS

The data gathering process was far less successful in 2015 than in the previous two years. A complete data set was only received in March 2017, delaying the reporting process. Renewed commitments to timeous annual data provision have been made.

Electricity consumption decreased by 1.2% in spite of significant population growth, a positive trend. The Jammie shuttle route optimization initiative was effective in reducing kilometres travelled and GHG emissions.

Reporting of electricity consumption needs improvement in terms of data quality. An improvement is expected for the 2016 report, since data will be obtained from the new digital metering system at a building level. In addition, regular reporting and monitoring by a consultant has been commissioned, as well as work towards regular communication of consumption trends to the UCT community via digital dashboards or the Intranet.

There is a need for more coordinated efforts to reduce emissions in line with local and global climate goals. The administration – and the executive and academics - should explore ways of using the information in these carbon reports to deliver innovative strategies to reduce emissions, raise awareness and encourage behavior change among the UCT community. A key area for improvement is air travel. The increase may reflect an upward trend in research-related travel by UCT academics. As previously recommended, consideration should be given to an appropriate offset approach for these emissions. The UCT Energy Research Centre would be able to provide recommendations.

It is important for the university, as a learning and research institution, to continue to involve the Information Systems students in the carbon footprint measurement process as part of the curriculum. This can deliver a range of enhanced learning outcomes already recognized by the Higher Education Learning and Teaching Association and the International Sustainable Campus Network (ISCN). Amongst these are preparedness for the challenges of climate change, developing literacy and understanding of sustainability, and a capacity for responsible local and global citizenship.

Further information and supporting data are available upon request.
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APPENDIX 1

TABLE 3: UCT CARBON FOOTPRINT for 2015 (*Updated Eskom emission factor (1.03 kgCO_2e/kWh)*			
CATEGORY		**tCO_2e**	**% of Total**
Scope 1	**Direct Emissions**	**1 659**	**1,74**
	Jammie Shuttle	861	0,90
	UCT vehicle Fleet	503	0,53
	LPG	160	0,17
	Diesel for generators	134	
Scope 2	**Indirect Emissions**	**72 986**	**76,37**
	Electricity: Main Campus	47 862	50,08
	Electricity: Medical campus	12 265	12,83
	Electricity: Off Campus Residences	11 065	11,58
	Electricity: Graduate School of Business	1 415	1,48
	Electricity: Hiddingh	-	-
	Electricity: ICTS on Main	379	0,40
Scope 3	**Other Direct Emissions**	**20 919**	**21,89**
	Fuel and energy-related	581	0,61
	Business travel	262	0,27
	Business travel - airlines	3 996	4,18
	Employee commuting	8 065	8,44
	Purchased goods - Food	6 936	7,26
	Purchased goods - Paper	382	0,40
	Purchased goods - Water	138	0,14
	Waste	558	0,58
	TOTAL emissions	**95 564**	**100**

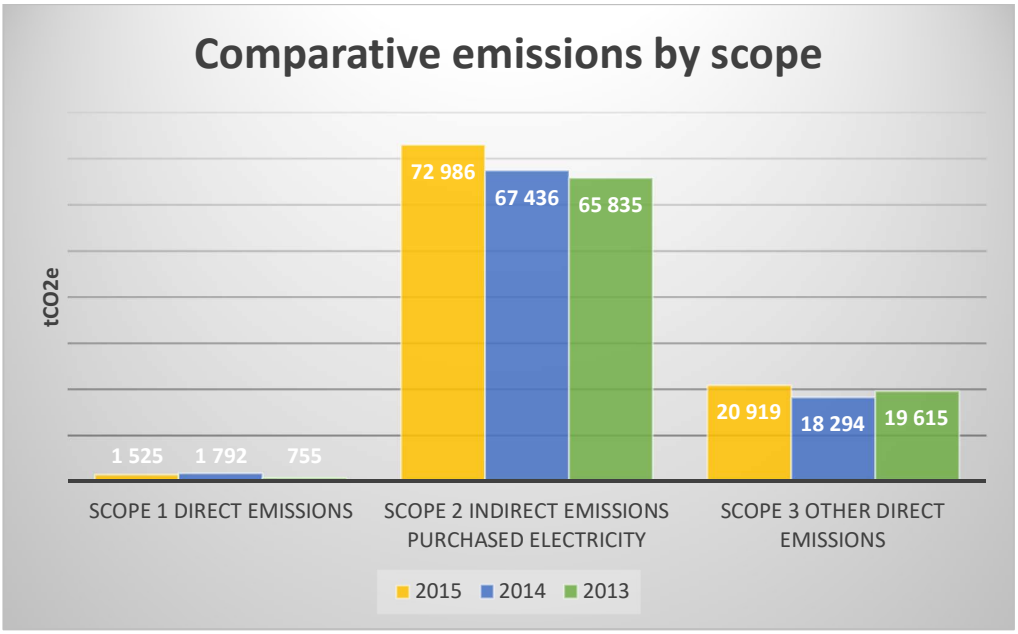

Figure 1: UCT Carbon Footprint 2015: Comparative emissions by scope (Updated Eskom emission factor (1.03 kgCO_2e/kWh)