SUSTAINABLE RESOURCE GENERATION: CARBON, ENERGY, WASTE AND WATER

INTRODUCTION

In keeping with the strategic thrust of having 'cost-conscious and effective and sustainable resource generation ', UJ puts a large emphasis on the sustainable use of resources. The following sections will outline UJ's carbon, energy, waste and water use during 2010.

CARBON FOOTPRINT

Overview

UJ engaged KPMG in 2010 to begin the process of measuring the carbon footprint as we firmly believe that 'what gets measured gets managed'. The *Green House Gas Protocol - a corporate accounting and reporting standard* (GHG Protocol) developed by the World Business Council for Sustainable Development (WBCSD) was used as a basis for determining the carbon footprint. The 2010 footprint will be used as the baseline for mitigation options and future comparatives.

Our overall carbon footprint amounted to 72 648 tons of carbon dioxide (CO_2) which equates to approximately 1.61 tons per student.

In order to calculate the carbon footprint, data from each item on the emissions inventory was analysed and relevant conversion factors applied to calculate the tons of CO_2 released by each source.

Eskom's 2010 conversion factor was used to calculate the emissions from purchased electricity. The other conversion factors were obtained from the United Kingdom's Department for Environment Food and Rural Affaires (DEFRA) factors which have been updated in October 2010. DEFRA's conversion factors are used by organisations worldwide to calculate their carbon footprints.

The table below provides a breakdown per source and campus.

Table: Overall Green House Gas emissions

Emissions Source	APK	DFC	APB	SWC	Total tons CO^2
Electricity	46 594 186	19 374 225	3 006 281	823 918	69 799
Natural Gas	821 968	512 875	512 875	0	1 848
Catbot	419 963	0	0	0	420
Petrol (Fleet)	181 957	45 454	9 769	11 382	249
Diesel (Fleet)	58 703	1 796	1 236	217 675	279
Diesel Generators	32 729	6 466	6 143	8 177	54
Total tons CO^2	**48 110**	**19 941**	**3 536**	**1 061**	**72 648**

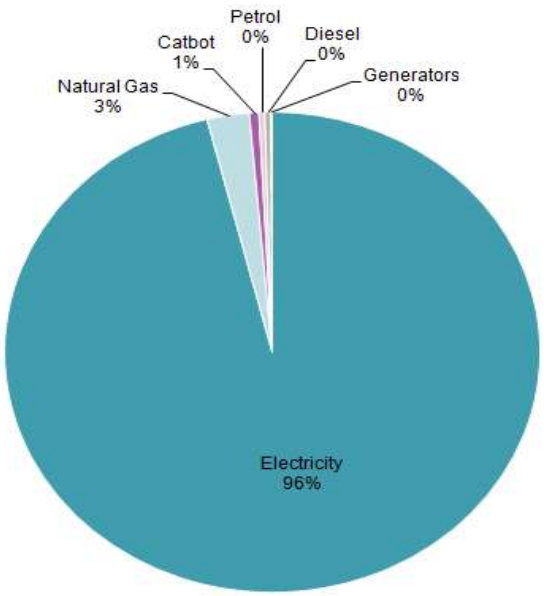

Figure: Overall emissions, all sources

Electricity makes up the majority of UJ's emissions with a 96% contribution. Natural gas makes up 3%, Catbot 1% and fleet petrol, diesel and generator diesel each make up less than 1% of the overall carbon footprint.

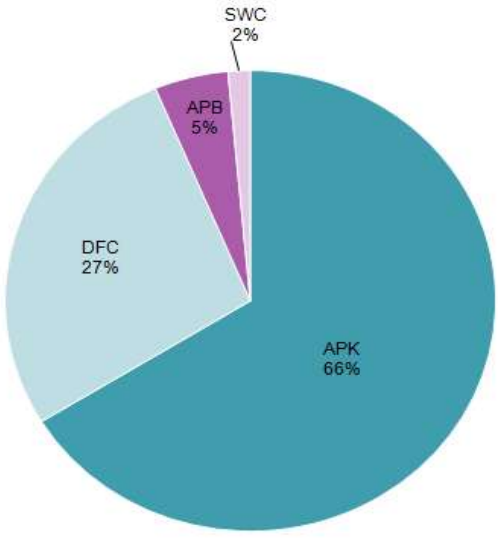

Figure: Overall Emissions – All Campuses

66% of the carbon footprint is from the APK campus, 27% from the DFC campus, 5% from APB and the final 2% from SWC.

Policy Framework
There is no specific policy in place for carbon footprint management.

Governance
The benefit of such an exercise is that it leads to identification of measurement and reporting processes which require improvement. This is the first year in which we have calculated our carbon footprint and the systems and processes we are currently using, whilst adequate, require further development. As we work through the recommendations we have been provided with, our reporting will improve and no doubt the carbon footprint will change due to measurement and reporting improvements as well as operational effects.

Performance
In order to mitigate UJ's carbon footprint, the following was introduced at the APB and APK Campuses:

- Utilising battery-operated golf carts on campus;
- Advocating paperless meetings;
- Advocating recycling and the implementation of recycling stations at both campuses;
- Placing an embargo on all new air-conditioning installations in offices;
- Planting additional 114 trees;
- Introducing timers on passage lights on the interior of buildings.

SWC
- The landscaping of the new development is generally indigenous and requires low maintenance. An ecological corridor or "green belt" running along the southern boundary fence acts as an ecological corridor – linking Enoch Sontonga Hill to the wetland precinct flanking the Campus to the west.

Property Management Services
- A Biodiversity Assessment & Detailed Ecological Management Plan for the UJ Island was compiled and is being implemented.

Transport and Environmental Services
- During an audit to determine the carbon footprint of the University, the Transport Office submitted full records of all vehicles, all fuel used and diesel drawn. The final outcome of the audit is still awaited.

Way forward
- UJ has begun a program to read the electricity meters on the four campuses.

- UJ will be installing meters and sub meters on all four campuses from February 2011. The type of meter used is approved by Eskom and provides live updates that can be read online. UJ plan to use this live update feature in their awareness campaign. Students and staff will be able to see when consumption is high, and will be able to reduce consumption accordingly.
- By reading the sub meters, UJ will be able to determine which buildings are using an excessive amount of electricity. Ultimately, UJ want to make someone accountable for the consumption in each area of the university, and to use these people to drive reduction initiatives for that specific area.
- The meters will also be used to reconcile electricity consumption figures with Eskom invoices enabling UJ to ensure that they are paying the appropriate amounts for consumption.
- SANS 204 Energy efficient building standard will be included in the formal EE policy as the standard to be used for infrastructure construction and operations at the university.
- In 2010 there has not been much focus on raising awareness of EE and the University's initiatives. UJ recognises that this will need to change in order to get the both the staff and student body behind the initiatives and to find more EE measures. A formal plan and policy will be developed that will include the raising of awareness.
- Challenges include: choosing the best medium to engage with the student body and staff. The campus design also means that meeting areas are not conducive to contacting or reaching students with direct awareness campaign.

ENERGY

Overview

UJ puts a large emphasis on Energy Efficiency (EE) and is aiming to be the leading exemplar of Energy Efficiency in the higher education sector. The additional drivers for improving EE at the university include:

- Cost reduction both through reduced tariffs and avoiding Eskom penalties for not reducing consumption (estimated to be R9 per kWh for institutions that do not lower their electricity use by 10%) with reference to the "punitive band" final proposal from Eskom is R 11.91.
- Responsible resource consumption.
- Energy conservation scheme (ECS) with reference to Eskom energy efficiency and demand side management (DSM) projects.

Policy Framework

There is no formal EE policy or charter in place; however a number of ad hoc activities are taking place.

There is an informal EE plan in place involving collaboration between the UJ Operations division and the other stakeholders. This plan is run by the EE committee.

Governance

The Energy Efficiency Committee takes care of energy management at UJ.

Performance

- UJ has been putting EE initiatives in place since the 80's. These included installing the latest EE lighting available.
- The first step was to conduct a baseline assessment of the current energy usage. UJ engaged KPMG Climate Change & Sustainability services to measure their baseline carbon footprint in 2010.
- An Energy Audit was conducted by the University to determine where to begin with energy reducing measures.
- UJ is working with Station 7 (Energy efficiency consultants). S7 have done a walk through estimating potential energy savings.
- UJ is currently engaging with Eskom regarding DSM (demand side management). UJ would like to take advantage of Eskom's standard offers; however, even if Eskom do not provide the relevant EE subsidies, UJ will go ahead with its EE initiatives.
- A number of initiatives are taking place, including: hot water load control, EE lighting, air conditioning control.

Auckland Park Campus:

- The operating conditionings for the air conditioners on the Auckland Park campus were adjusted for 'four seasons': in Summer, only cold water is used, while in winter, only hot water is used. As such, the hot and cold systems no longer conflict with each other. Presently consumption of catbot fuel is +/- 120 kilolitres and in 1977 this consumption was +/- 500 kilolitres.
- The BMS (building management system) has been upgraded over the years.
- Economy cycle air conditioning units are centrally installed. This makes it possible to optimize on outside air, therefore saving energy.
- Library and B les 100 and 200 – use the latest lighting technology available.
- Light bulbs – since 1978 there has been a change to fluorescent tubes. All the incandescent lights builds have been systematically and methodically removed.

- The hot water requirements for air-conditioning units are generated with catbot fuel (original source of energy was diesel) catbot fuel is more or less 50% less expensive than diesel.
- Hot water boilers (t 80°C) – this hot water is distributed throughout the campus to central air handling units.

Multi campus

- Generators cater for blackouts – there are 47 in total across all the campuses and 48 UPS (Uninterrupted Power Supplies) in process to be installed.
- Data projectors and security systems are run on UPS.

Residences

- New residences on Soweto campus are using solar water heaters.
- New residence on Auckland Park campus is using heat pumps. Since 1983 residences on Auckland Park campus are using Sasol gas.

Way Forward

- The University has decided to develop a more strategic and focused response to EE.
- UJ has set an unofficial target of reducing electricity consumption by 25%, from 2011, over a 3 year period.
- UJ have identified high energy consumption points in their residences and will target these areas for reduction.
- Initiatives will be embedded in a charter and policy for effective organisation wide implementation.

WASTE MANAGEMENT

Overview

UJ management will adopt a holistic approach which will ensure that waste is dealt with in an environmentally responsible and health and safety manner from its generation at source through to its ultimate disposal.

UJ aims to ensure that all waste generated on the grounds is stored, transported and disposed of in such a manner that it does not create a risk to the health and safety of people and the environment.

Policy Framework

UJ have a formal, university wide Waste Management Policy in place. The Policy is available on the UJ website.

Governance

Waste Management falls under the Occupational Safety Department that will:

- Minimize and where possible prevent the generation of waste on all campuses.
- Identify and classify all waste generated on the grounds of UJ.
- Have procedures in place to ensure that all waste identified is being stored, transported and disposed of in such a manner that it will not pollute the environment or cause health hazards.
- Adopt a cradle to grave principle.
- Actively getting involved in recycling of waste by making use of external service providers.

The Occupational Safety Coordinator is overall responsible for the management of waste on campus.

Safety Practitioners appointed on each campus are responsible for the day to day management of all waste and the controlling of the recycling stations. The Safety Practitioners report to the Occupational Safety Coordinator.

Performance

- The waste areas and recycling stations on the APK and SWC have been completed and recycling will start in June 2011.
- On the DFC and APB campuses recycling started in August 2009.
- Colour coded waste recycling containers have been placed at strategic areas around campus. The containers cater for the recycling of the following, paper (blue), tin (red), plastic (yellow), glass (light blue) and others (green).

Recycled waste

Commercial paper	White paper	Plastic	Cans	Alum	Card boxes	Glass	Total
19 ton	41 ton	14 ton	8 ton	2 ton	26 ton	27 ton	137 ton

Total waste generated

General waste	Building rubble	Hazardous waste	Medical waste	Total waste generated
1298 ton	407 ton	66 ton	5 ton	1776 ton

- The total waste recycled from the total waste generated was 7.7%.
- Budget Waste is contracted to remove and dispose of all hazardous waste from UJ. Safe disposal certificates are used for hazardous waste disposed of. APK and DFC have specific areas where hazardous waste is stored as per the

minimum requirements stipulated by the Department of Water Affairs and Forestry.

- Hazardous waste is disposed of as per the minimum requirements under waste classification and disposal methods.
- Boxes for the recycling of cartridges have been placed at strategic areas on campus. The Safety Practitioner of each campus is responsible for the removal of the boxes once full. The boxes are removed and transported to the DFC campus where it is stored for collection.
- Used oil are collected and recycled by external companies.
- Florescent tubes are kept in containers at the waste area on each campus. Once the containers are full the florescent tubes are transported to DFC by a vehicle registered to remove hazardous goods.
- The florescent tubes are crushed by an external waste controller for disposal by the external service provider.
- Safety tips regarding generation of waste and resources are placed on UJ intranet.
- Safety Practitioners attend workshops on legislation regarding waste.
- Monthly safety inspections at the waste areas are conducted by the Safety Practitioners. Deviations are reported to the Head Occupational Safety Coordinator.
- Waste management forms part of the Health and Safety monthly meetings. The Health and Safety minutes are distributed to MEC for reference and feedback.

Way forward

- Have one service provider in place responsible for the removal of all waste generated by UJ.
- The service provider appointed will put in place waste controllers that will assist with the recycling program on all four campuses including the Eiland.
- The waste controller will separate the waste in the following categories, Common paper, White Paper, Plastics, Cans, Cardboard Boxes and Glass.
- Part of the income generated from the recycling will be given back to UJ. Proper recycling will also minimize the cost paid to the service provider for the removal of waste.
- Increase recycled waste to14,3% in 2011.
- Place additional colour coded recycling containers at strategic areas.

WATER

Overview

UJ have taken some big steps in 2010 towards managing water sustainability. The drivers for water management at UJ include:

- Cost reduction through reduced consumption
- Responsible consumption of a scarce resource

- Current cost of R25/kilolitres (water consumption measured for educational use and sewerage systems)

Policy Framework

There is no specific policy in place for water management.

Governance

The Energy Efficiency Committee also takes care of water management at UJ.

Performance

APK

- 2010 marked the completion of the water project on the APK campus. This project uses both borehole water and rain water in order to supplement the municipal supply. The borehole and rain water contribute 35000 kilolitres to the universities water supply. The project originally came about due to the following:
  - The council was only able to supply water to the Campus with pressure of 2bar. As such, UJ installed two storage tanks on the APK campus. The 1100 kilolitres of water in these tanks is tested and treated for human consumption and UJ is able to maintain the water pressure at 5 bar pressure with variable speed pumps.
  - It is cost effective to use borehole water for the garden and sewerage systems. The plan of action is to mix municipal water with borehole water (50%/50%). This also makes the water supply less vulnerable to municipal supply interruptions. Able to operate for 2 to 3 days without municipal supply.
- A project to change the types of plants grown on campus has been introduced. The aim of this initiative is to have plants that are more climate-adaptable and therefore use less water on campus.
- An irrigation management system has been installed in order to reduce water consumption. This system makes use of soil moisture sensors. Manual shut off valves are used to stop irrigating campus areas that already have sufficient soil moisture content.
- Civil engineering students have been running a grey water use project for 18 months on the APK campus. This involves rainwater catchment to use in sewerage and irrigation systems

DFC

- Water streams flowing under the newly purchased Perskor Building have been identified as a potential source for irrigation water and for use in flushing toilets.

SWC

- There are storm water harvesting tanks at the athletics track which collect the excess irrigation water and pump it up into the storage tanks. This ensures that the Campus reduces its water demand.

Transportation and Environmental Services

- A project was launched to seal the main fountain within the centre court of the APK Campus, through which many kilolitres of water were lost monthly.
- It was noticed that whenever interruptions of water supply occurred, staff and students tend to leave taps open on discovering that there is no water. The cleaning staff have, as a result, been trained/conditioned to make it part of their standing operating procedure to check and close all water outlets.

Property Management Services (UJ Island)

- A project had been initiated to eradicate bluegum trees on the Island.

Water Consumption		
Campus	**Total Municipal Water in kl**	**Total Borehole Water in kl**
APK	301 390	35 000
APB	82 892	None
DFC	276 718	None
SWC	12 000	None
Total	673 000	35 000

Way forward

The initiative to use grey water for irrigation and sewage will be rolled out to the other three UJ campuses, commencing 2011.

A water audit has been conducted on the campuses. From this audit, residences have been identified as points of high water consumption. This will be addressed by installing water meters at each residence. Once the meters are in place, awareness programs for students will be set up.

UJ has begun a program to read all the water meters on the four campuses. This initiative began in June 2010 and will continue to monitor the water use in future. This will provide accurate monthly data for water use and enable UJ to reconcile water consumption to invoiced amounts from the municipality to ensure they are paying appropriate amounts for consumption.

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