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JOHANNESBURG

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ANNUAL  
REPORT



The Future  
Reimagined

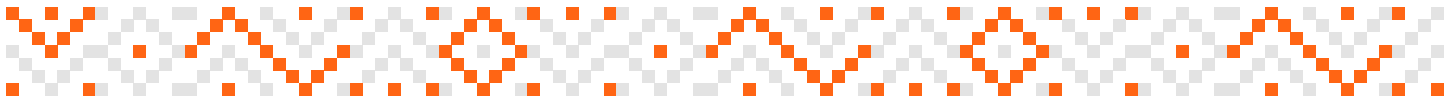


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# Statement on Environmental Sustainability

## OVERVIEW

UJ has committed itself to improving on its sustainable practices in all of its University activities. The development of the UJ Strategic Plan 2025, anchored in the overarching goal of global excellence and stature (GES), has placed a requirement on the institution to improve on its sustainability footprint.

### **Strategic Objective Six**

Strategic Objective Six, fitness for global excellence and stature, states that *“We will also minimise harmful impact on our environment through managing our carbon footprint, reducing energy and water wastage, encouraging paperless communication, and overall fostering of a culture of responsible stewardship”*.

UJ has seen a growing commitment towards the goal of being a sustainable institution that strives to implement improvements and actions across all spheres of its campus activities. UJ firmly believes that sustainable development is a long-term commitment and aims to contribute to sustainability by reducing its environmental footprint, while enhancing its contributions to the social and economic development of South Africa.

This report highlights some of the specific focus areas, as well as improvements achieved during 2021.

## ENERGY MANAGEMENT

### **Carbon footprint**

UJ’s carbon footprint analysis was based on its actual 2021 energy consumption. The total carbon footprint for 2021, based on energy consumption from various sources, is approximately 37 692 tons of CO<sub>2</sub> compared to the 41 403 tons reported during 2020 (refer to Tables 17 and 18, respectively). This indicates a decrease of approximately 8,96%. This can be attributed almost entirely to the continued effect of the various COVID-19 lockdown levels that were applied at various times during 2021 with the consequent reduction in foot traffic on all UJ campuses and off-campus facilities.

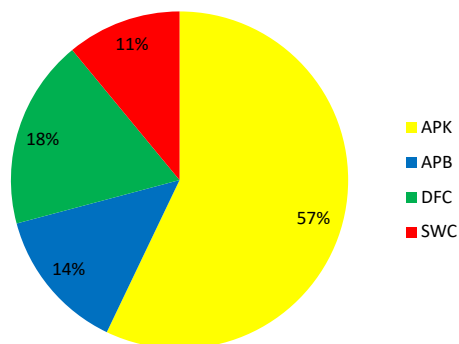
In considering this figure, the following should be noted:

- UJ has increased its built area footprint by 10,65% as from 2013.
- The Auckland Park Kingsway Campus continued to contribute significantly to the overall carbon footprint with 22 865 tons of CO<sub>2</sub> compared to the overall University footprint of 37 692.
- Infrastructure on the campuses is included in the consumption figures.
- The methodology of measuring the carbon footprint is based on absolute consumption on main campus areas, excluding UJ owned properties that are not designated as part of the campuses.
- It is the first time that reporting on power generation has led to a measurable decrease in the carbon generated by UJ – the decrease of carbon generated must also be seen against the 6,501% electricity generated by the solar PV plants. This must also be seen against the fact that at times the solar PV plant was not operating optimally because of the lighter foot traffic on the campuses – this will certainly not be the case in 2022.

**Table 17: Carbon footprint based on 2021 actual consumption**

Emission Source	Kingsway Campus (APK)	Bunting Road Campus (APB)	Doornfontein Campus (DFC)	Soweto Campus (SWC)	Total CO <sub>2</sub>	Total tons of CO <sub>2</sub>
Electricity (kWh)	20 593 152	4 984 176	6 487 456	4 074 804	36 139 587	<b>36 140</b>
Natural Gas (GJ)	1 005 967	255 567	234 048	0	1 495 582	<b>1 496</b>
Catbot	0	0	0	0	0	<b>0</b>
Petrol (fleet)	159 627	40 060	66 651	41 286	307 624	<b>308</b>
Diesel (fleet)	90 423	11 919	36 205	52 383	190 930	<b>191</b>
Diesel generators	35 217	10 670	6 091	5 905	57 882	<b>58</b>
Inter-campus bus and staff flights	980 083	203 413	443 811	221 906	1 849 213	<b>1 849</b>
Paper used by UJ/ KMSA sites	277	54	119	56	505	<b>1</b>
<b>Total kg of CO<sub>2</sub></b>	<b>22 864 745</b>	<b>5 505 859</b>	<b>7 274 381</b>	<b>4 396 339</b>	<b>40 041 325</b>	<b>40 041</b>
<b>Total Tons of CO<sub>2</sub></b>	22 865	5 506	7 274	4 396	40 041	<b>Reduction of Electrical Power</b>
Solar PV generation (tons CO <sub>2</sub> )	1 028	501	411	410	2 349	<b>6,5%</b>
					<b>Total tons of CO<sub>2</sub></b>	<b>37 692</b>

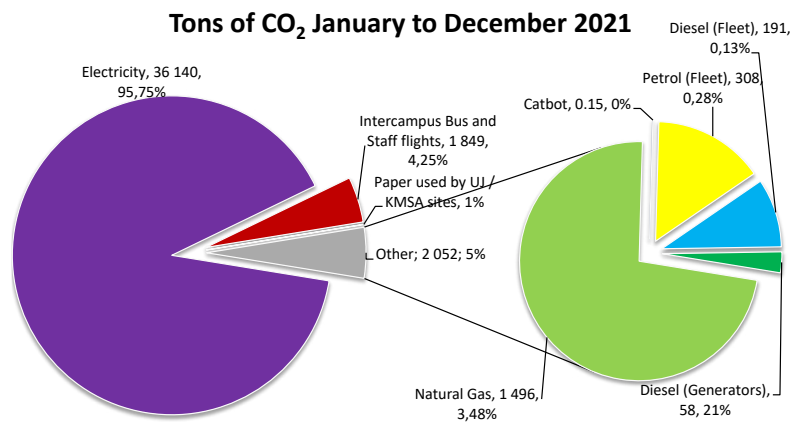
This highlights a decrease of 8,96% as compared to the usage in 2020.  
 The 2021 carbon footprint breakdown is as per Figures 1 and 2 depicted.



**Figure 1: CO<sub>2</sub> production per campus**

**Table 18: Carbon footprint based on 2020 actual consumption**

Emission Source	Kingsway Campus (APK)	Bunting Road Campus (APB)	Doornfontein Campus (DFC)	Soweto Campus (SWC)	Total CO <sub>2</sub>	Total tons of CO <sub>2</sub>
Electricity (kWh)	20 708 411	5 845 577	7 988 701	3 457 593	38 000 280	<b>38 000</b>
Natural Gas (GJ)	923 004	334 099	281 928	0	1 539 030	<b>2 416</b>
Catbot	38 581	0	0	0	38 581	<b>39</b>
Petrol (fleet)	163 373	30 746	71 159	61 342	326 620	<b>327</b>
Diesel (fleet)	229 424	23 325	54 062	51 435	358 246	<b>358</b>
Diesel generators	62 102	0	2 353	47 565	112 020	<b>112</b>
Inter-campus bus and staff flights	520 376	147 276	206 187	108 003	981 842	<b>982</b>
Paper used by UJ/ KMSA sites	831 905	162 085	356 499	168 182	1 518 671	<b>1 519</b>
Total kg of CO <sub>2</sub>	<b>23 477 176</b>	<b>6 543 107</b>	<b>8 960 889</b>	<b>3 894 118</b>	<b>42 875 291</b>	<b>43 753</b>
Total Tons of CO <sub>2</sub>	23 477.18	6 543.11	8 960.89	3 894.12	42 875.29	<b>Reduction</b>
Solar PV generation (tons CO <sub>2</sub> )	<b>1 027.59</b>	<b>500.92</b>	<b>410.69</b>	<b>410.30</b>	<b>2 349.50</b>	<b>6,18%</b>
					<b>Total tons of CO<sub>2</sub></b>	<b>41 403</b>



**Figure 2: January to December 2021 YTD tons of CO<sub>2</sub> per emission source**

## Electricity

For January to December 2021, the University of Johannesburg achieved an electrical energy savings of 37,69%, compared to the 2015 baseline (which is the initial value against which we are required to report going forward) for all properties, based on an absolute measurement methodology. The measurement methodology makes no allowance for infrastructure changes or fluctuations in student or staff numbers. This saving was achieved against an adjusted additional savings from 2020 of the 5,75% target set for the 2021 year, which was not met by the actual savings of 4,9% of Eskom purchased power; however, this must be seen against the context of the 2020 consumption being off a very low base.

The various energy savings initiatives that have started showing positive results are the following:

- The own generation of power through the solar photovoltaic (PV) plants now operating on all four campuses.
- The implementation of energy saving lights (LEDs).
- Occupancy sensors (implementation still ongoing).
- The increased use of gas for water heating at residences on the APB and DFC Campuses.
- The further installation of heat pumps, especially in new and refurbished residences.
- The installation of energy efficient showerheads.
- The installation of load control ripple relays.

Continuing with these types of initiatives, including the introduction of further photovoltaic (PV) systems, together with awareness campaigns, will further improve on savings. Since 2018, savings have been lowest on APK, due to increased HVAC and the growth in specialist research equipment on the campus. Table 19 identifies the 2021 energy savings expressed as a percentage – note that the first three months of 2021 are being compared against a pre-pandemic period in 2020 and therefore show dramatic reductions – after this, slight increases reflect the difference between hard lockdown 2020 consumption and the more relaxed lockdowns and partial return to campuses from June 2021.

**Table 19: Electrical energy savings (2021) based on 2020 consumption (includes own generation)**

Month	APK	APB	DFC	SWC	Total
Jan-21	-34,99%	-23,55%	-35,77%	-29,74%	<b>-33,19%</b>
Feb-21	-36,92%	-39,14%	-42,49%	-36,61%	<b>-38,26%</b>
Mar-21	-19,15%	-35,36%	-28,52%	19,5%	<b>-20,7%</b>
Apr-21	25,56%	-16,95%	1,44%	47,87%	<b>15,64%</b>
May-21	39,16%	-2,45%	16,45%	74,33%	<b>30,93%</b>
Jun-21	22,51%	-12,99%	10,69%	65,03%	<b>17,73%</b>
Jul-21	2,18%	-19,07%	-12,96%	25,29%	<b>-2,23%</b>
Aug-21	21,75%	14,64%	-0,48%	37,44%	<b>17,52%</b>
Sep-21	5,33%	-2,85%	-9,63%	23,34%	<b>2,55%</b>
Oct-21	0,57%	-7,66%	-13,42%	20,17%	<b>-1,6%</b>
Nov-21	-1,97%	-11,41%	-14,09%	3,18%	<b>-5,27%</b>
Dec-21	5,35%	-10,47%	-0,52%	0,05%	<b>1,37%</b>
<b>Totals</b>	<b>-0,56%</b>	<b>-14,74%</b>	<b>-12,41%</b>	<b>17,85%</b>	<b>-3,42%</b>

The 2021 YTD total electricity consumption is highlighted in Table 20.

**Table 20: 2021 YTD total electricity consumption**

Month	APK	APB	DFC	SWC	Total
Jan-21	1 284 546	327 663	396 980	207 366	<b>2 216 555</b>
Feb-21	1 369 668	348 379	407 268	232 426	<b>2 357 741</b>
Mar-21	1 674 106	376 240	494 959	319 051	<b>2 864 356</b>
Apr-21	1 687 001	343 917	497 586	327 651	<b>2 856 155</b>
May-21	1 960 426	414 246	584 452	395 405	<b>3 354 529</b>
Jun-21	1 926 328	426 521	626 125	402 263	<b>3 381 237</b>
Jul-21	1 815 066	431 489	589 461	383 437	<b>3 219 453</b>
Aug-21	2 045 929	583 244	658 207	432 926	<b>3 720 306</b>
Sep-21	1 671 462	458 463	584 079	357 089	<b>3 071 093</b>
Oct-21	1 804 003	475 225	557 316	377 689	<b>3 214 233</b>
Nov-21	1 556 271	390 243	497 245	314 425	<b>2 758 184</b>
Dec-21	1 198 545	263 376	404 824	206 392	<b>2 073 137</b>
<b>Totals</b>	<b>19 993 351</b>	<b>4 839 006</b>	<b>6 298 501</b>	<b>3 956 120</b>	<b>35 086 978</b>

**Natural gas**

Sasol natural gas (Egoli gas) now contributes 3,97% to UJ's total carbon footprint. Natural gas is used mainly in student centres for the purposes of food preparation, as well as in residences for the generation of hot water, and in small quantities at the laboratories for experiments. The saving achieved on gas reduction for 2021 compared to 2015 is 49,3% (again reiterating that the baseline is the 2015 figure for gas consumption). Note that the annual savings – even in the reduced COVID-19 lockdowns in 2020 – have increased further.

Egoli natural gas has a lower CO<sub>2</sub> footprint per gigajoule (GJ) of energy when compared to coal and is therefore a cleaner source of energy. Egoli natural gas will in future be used at a number of residences for heating water and cooking. Since a great deal of gas is used for heating on the APB Campus, there is a plan to trial a 500kW combined heat and power (CHP) power generation facility to simultaneously reduce dependence on Eskom power and to reduce the campus carbon footprint further. The continuing diversification of energy sources, from 2019 onwards, will result in a small but measurable continual reduction in the carbon footprint, especially at the residences.

**Petrol, diesel and travel related usage**

Petrol and diesel fuels are primarily consumed as fuel sources for UJ's vehicle fleet as well as for diesel generators across its main campuses. There are currently 84 generators installed at various points within the UJ infrastructure. Petrol and diesel contribute a small amount to the total carbon footprint, namely 1,48%. It must be noted that increasing occurrence of Eskom load shedding has already produced an increase in diesel usage, and this may result in further substantial CO<sub>2</sub> generation in future, since liquid fuels have a higher CO<sub>2</sub> generation per GJ of energy consumed. There was a small increase in local travel during 2021, but there was a halving of diesel used for backup generators as well as diesel for maintenance vehicles used as standby vehicles during the lockdown periods.

Since 2019, UJ has also started reporting energy consumption and CO<sub>2</sub> generation resulting from the extensive student bus service operated between campuses, as well as the effective CO<sub>2</sub> generation due to staff related national and international flights. In 2021, the renewal of staff flights as well as a subdued return to a more normal student bussing situation resulted in a doubling of carbon generation. For 2021, this carbon generation source was 4,91% of the total UJ generation.