University
of Sadat City

CARBON
Footprint
Report 2022
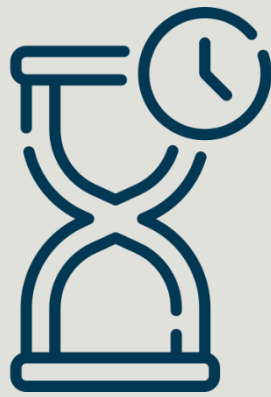
Act now, before it is too late.

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TEAMWORK

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Abbreviations & Acronyms

CFP	Carbon Footprint
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
EF	Emission Factors
EFDB	Emission Factor Database
ESRI	Environmental Studies and Research Institute
FCAI	Faculty of Computers and Artificial Intelligence
GEBRI	Genetic Engineering and Biotechnology Research Institute
GHGs	Greenhouse Gases
GWP	Global warming potential
HCFCs	Hydrochlorofluorocarbons
HFCs	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
kwh	kilowatt-hour
LPG	Liquefied petroleum gas
NG	Natural Gas
N_2O	Nitrous oxide
ODP	Ozone Depletion Potential
PFCs	Perfluorocarbons
SF_6	Sulphur hexafluoride
tCO_2e	tons of Carbon Dioxide Equivalent
T&D	Transmission and distribution
USC	University of Sadat City

01

INTRUDUCTION

1. INTRODUCTION

1.1 Climate Change

Based on multiple independent analyses of measurements for multiple complementary indicators, it is virtually certain that the climate is changed since the mid-20th century; land surface air temperature increased, sea-surface, and marine air temperature increased, and hence sea level increased, summer arctic sea-ice decreased … etc. as shown in figure (1-1). [1]
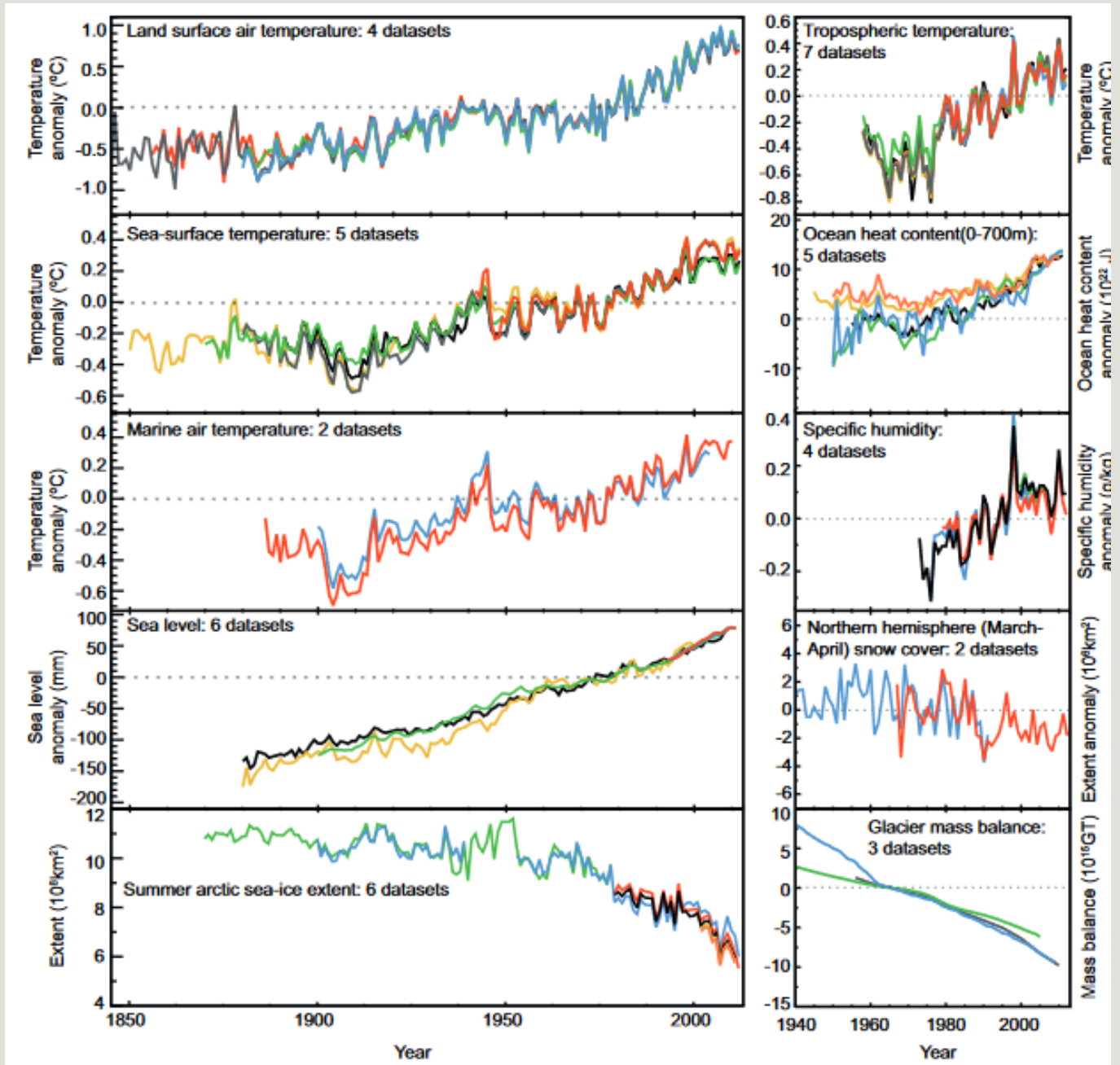

Figure 1-1 Multiple complementary indicators of a changing global climate [1]

According to our response, these changes in global mean temperature may be increased to a catastrophic level or it will be slowed to +1.5 °C only as shown in Figure (1-2). [2]
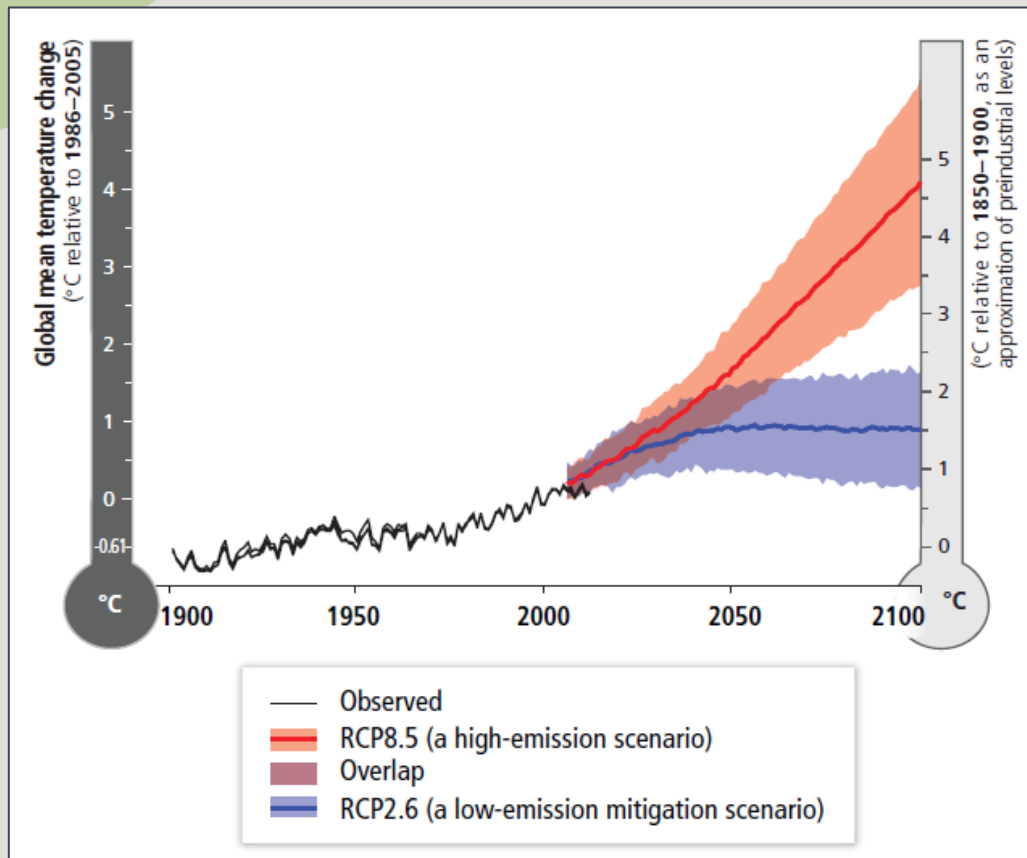
Figure 1-2 Global mean temperature change till 2100 at different scenarios [2]

If no serious actions are taken for mitigation and adaptation; several risks would be threatening humanity and the whole ecosystem such as:

- Death, injury, and disruption to livelihoods, food supplies, and drinking water Loss of common-pool resources, sense of place, and identity, especially among indigenous populations in rural coastal zones.
- Death, injury, and disruption of human security, especially among children, elderly, and disabled persons.
- Increased mortality and morbidity during periods of extreme heat.
- Loss of agricultural productivity (Risk of food insecurity).
- Destruction of livelihoods particularly for those depending on water-intensive agriculture.
- Loss of coral cover, Arctic species, and associated ecosystems with reduction of biodiversity and potential losses of important ecosystem services.
- Risk of loss of endemic species, mixing of ecosystem types, and increased dominance of invasive organisms.
- Reduction of biodiversity and potential losses of important ecosystem services.
- Risk of loss of endemic species, mixing of ecosystem types, and increased dominance of invasive organisms. [2]

Figure 1-3 University of Sadat City

The University of Sadat City (USC) is an Egyptian Public University conveniently located in Sadat city, north-western of Cairo. USC was initially established as several faculties affiliated with Menofia University during the period from 1993 to 2007, then was adopted as a branch of Menofia University from 2007 to 2013. In 2013 USC's Campus was founded by the presidential decree on the 25th of March. The following data represent 2022 stats about USC. Detailed survey of faculties and scientific research institutes, staff, and students is shown in Table (2-1).

9 Faculties

2 Research Institutes

754
Academic Staff

31,936 Students
(Undergraduate
& Postgraduate)

1,467
Non-academic Staff

Table 1-1 Survey of academic, non academic staff, and students of USC (2022)

Faculty/Institute/Organization	Academic Staff	Students	Non-academic Staff
Faculty of Pharmacy	43	580	36
Faculty of Veterinary Medicine	136	1,295	104
Faculty of Computers and Artificial Intelligence (FCAI)	22	517	22
Genetic Engineering and Biotechnology Research Institute (GEBRI)	130	549	101
Environmental Studies and Research Institute (ESRI)	59	888	50
Faculty of Commerce	18	9,241	64
Faculty of Education	22	4,948	63
Faculty of Physical Education	210	3,330	63
Faculty of Education for Early Childhood	21	1,830	29
Faculty of Law	55	8,038	63
Faculty of Tourism & Hotels	81	1,300	60
University Administration	….	…	603
University Housing	….	…	245
Total (2022)	**754**	**31,936**	**1,467**

02

METHODOLOGY

image: Freepik.com

2. METHODOLOGY

2.1 Carbon Footprint (CFP)

The six regulated greenhouse gases (GHGs) are Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF_6). The total set of greenhouse gases emissions caused directly and indirectly by an individual, organization, event, or product is commonly called their **Carbon Footprint (CFP)**. Establishing CFP of an organization can be the 1st step in a program to reduce the emissions it causes. [3]

Greenhouse gas emissions can be classified into three main types (Figure 2-1), and can be calculated using the following equation:

> **GHG emissions** (CO_2e) **= activity data** (unit) **x emissions factor** (CO_2e/ unit)

Calculating an organization's carbon footprint can be an effective tool for ongoing energy and environmental management. Having quantified the emissions, opportunities for reduction can be identified and prioritized, focusing on the areas of greatest savings potential [3].
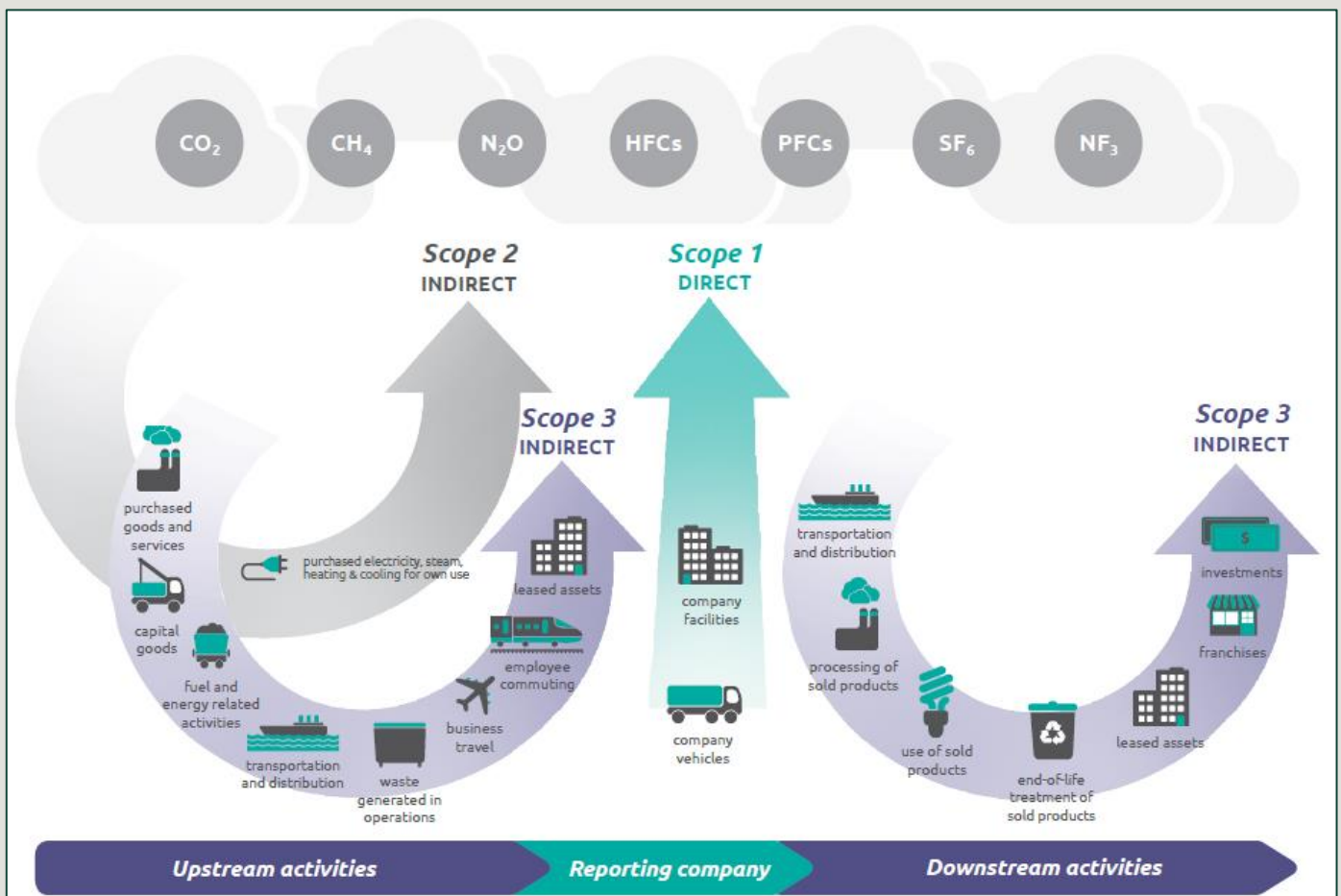

Figure 2-1 Overview of GHG Protocol scopes and emissions across the value chain [4]

2.2 Reporting Period & Operational Boundaries

Calculations of the CFP for USC included the calendar year from 01-01-2022 to 31-12-2022 for the GHGs sources shown in Table (2-1).

Table 2-1 GHGs sources included in CFP calculations for USC and used emission factors

Scopes	Included GHGs sources		Emission Factors
Scope I	Owned Vehicles		**2.699** kg CO_2e/ liter of diesel [5]
			2.340 kg CO_2e/ liter of Petrol [5]
	Generator		**2.699** kg CO_2e/ liter of diesel [5]
	Cookers		**1.557** kg CO_2e/ liter of LPG [5]
			2.016 kg CO_2e/ m^3 of NG [5]
	Agricultural tractors		**2.699** kg CO_2e/ liter of diesel [5]
	Freon Leakage		**2,088** kg CO_2e/ kg of R-410a [5]
			1,810 [*] kg CO_2e/ kg of R-22 [5]
	Fertilizers		**0.01** kg N_2O/kg N [6]
	Livestock	Camels	**46** kg CH_4/head/year [7]
		Buffaloes	**55** kg CH_4/head/year [7]
		Cows	**32** kg CH_4/head/year [7]
		Sheep	**8** kg CH_4/head/year [7]
		Goats	**5** kg CH_4/head/year [7]
Scope II	Electricity Consumption		**0.518** kg CO_2e/ kwh [**]

Scopes	Included GHGs sources	Emission Factors
Scope III	Purchased goods (Paper)	**919.4** kg CO_2e/ ton [5]
	Transmission and distribution (T&D) losses	**10.95%** [***]

[*] Although the global warming potential (GWP) of R22 is less than R410a, it is not the environmentally preferred option as R22 is a hydrochlorofluorocarbon (HCFC) which reach the stratosphere where they deplete the stratospheric ozone layer, while R410 is a hydrofluorocarbon (HFC) and have zero Ozone Depletion Potential (ODP) because they do not contain chlorine [9], [10].

[**] There is no official emission factor for electricity consumption from Egyptian grid, and this emission factor used by different organization in CFP reporting.

[***] Specific for electricity grid in Egypt [8]

03
RESULTS

3. RESULTS

3.1 Scope I

3.1.1 University Fleet

The USC fleet consumed 170,140 liters of diesel and 105,895.52 liters of petrol (gasoline) as shown in table (3-1) causing GHGs emissions reached to **707.003 tCO₂e** which represented **41%** of scope I emissions in 2022. In comparison with 2021 report, GHGs emissions from USC fleet in 2022 increased as shown in figure (3-1).

Table 3-1 GHGs Emissions (tCO2e) from university fleet | USC | 2022

Faculty/ Institute	Vehicles	No.	Consumption	GHGs Emissions
F. of Pharmacy	Private Car (Petrol)	1	6,900	
F. of Veterinary Medicine	Private Car (Petrol)	1	6,744	
FCAI	Private Car (Petrol)	1	5,000	
GEBRI	Private Car (Petrol)	1	2,600	
ESRI	Private Car (Petrol)	1	6,000	
F. of Commerce	Private Car (Petrol)	1	2,030	**247.796 tCO₂e**
F. of Education	Private Car (Petrol)	1	5,768.5	
F. of Physical Education	Private Car (Petrol)	1	5,700	
F. of Early Childhood Education	Private Car (Petrol)	1	4,927.3	
F. of Law	Private Car (Petrol)	1	2,650	
F. of Tourism & Hotels	Private Car (Petrol)	1	8,598.72	
University administration	Private Car (Petrol)	11	48,977	
	Buses 52 (Diesel)	8		
	Buses 28 (Diesel)	15		
	Minibus 14 (Diesel)	15	168,352	**447.091 tCO₂e**
	Trucks (Diesel)	7		
	Ambulances (Diesel)	2		
University Housing	Truck (Diesel)	1	1,788	

Note: Only private cars were added to each faculty/institute, but other vehicles added only to university administration to prevent duplicate account.
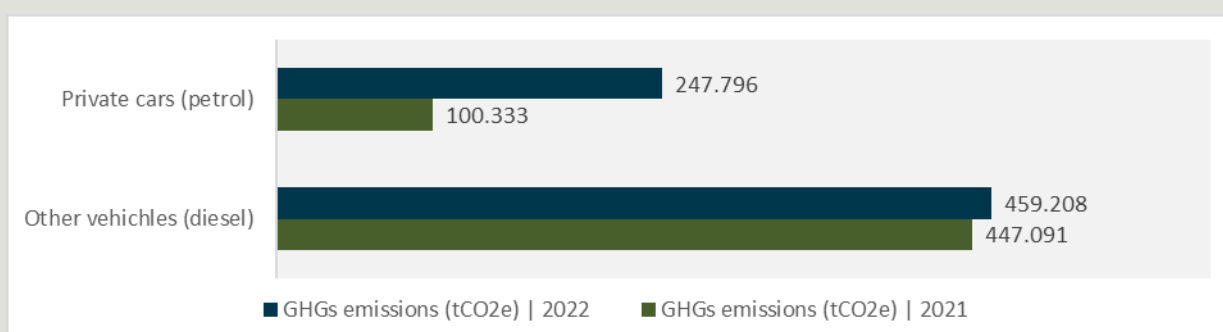

Figure 3-1 GHGs Emissions (tCO₂e) from university fleet | USC | 2021 and 2022

3.1.2 Generators

During 2022, generators consumed 4,938 liters of diesel as shown in table (3-2) causing GHGs emissions that didn't exceed **13.328 tCO₂e** (represent **0.8%** only of scope I emissions in 2022). In comparison with 2021, reported GHGs emissions from generator decreased as shown in figure (3-2).

Table 3-2 GHGs Emissions (tCO$_2$e) from generators | USC | 2022

Faculty/ Institute	Diesel consumption	GHGs Emissions
F. of Pharmacy	479	
F. of Veterinary Medicine	479	
FCAI	Not reported	
GEBRI	300	
ESRI	Not reported	
F. of Commerce	1,580	
F. of Education	Not reported	**13.328 tCO₂e**
F. of Physical Education	Not reported	
F. of Early Childhood Education	Not reported	
F. of Law	1,580	
F. of Tourism & Hotels	120	
University administration	200	
University Housing	200	

Generators
- GHGs emissions (tCO2e) | 2022 : 13.328
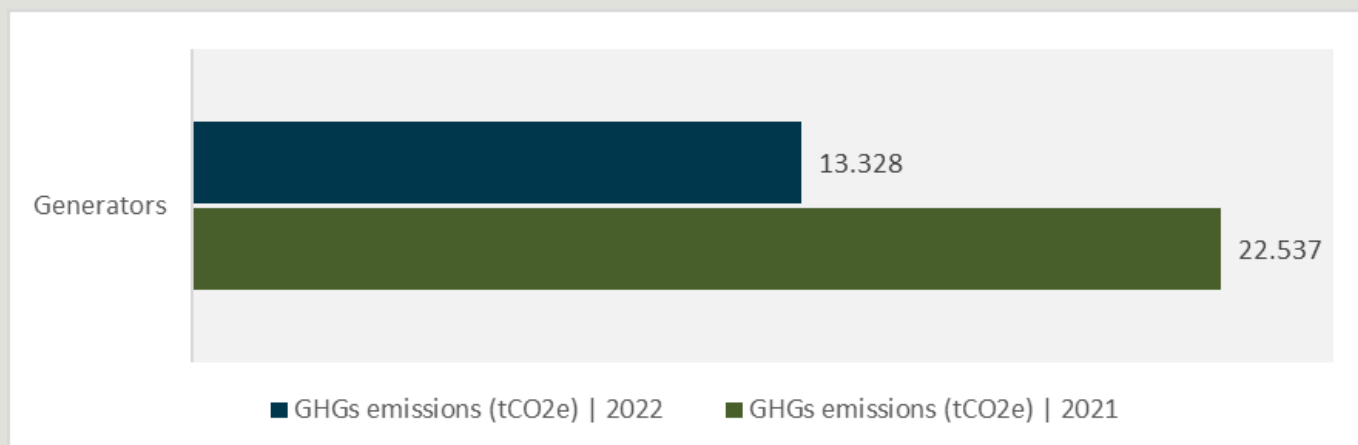- GHGs emissions (tCO2e) | 2021 : 22.537

Figure 3-2 GHGs Emissions (tCO$_2$e) from generators / USC | 2021 and 2022

3.1.3 Cookers

During 2022, 10,615 liters of LPG and 258,279 liters of NG were consumed by cookers as shown in table (3-3) causing GHGs emissions of **537.218 tCO$_2$e** (represent **31.1 %** of scope I emissions in 2022). GHGs emissions from cookers in 2022 increased nearly twice as much as reported in 2021 as shown in figure (3-3).

Table 3-3 GHGs Emissions (tCO$_2$e) from cookers | USC | 2022

| Faculty/ Institute	Fuel type	Consumption	GHGs Emissions
F. of Pharmacy	LPG	210	
F. of Veterinary Medicine	LPG	Not reported	
FCAI	LPG	450	
GEBRI	LPG	360	
ESRI	LPG	75	
F. of Commerce	LPG	520	
F. of Education	LPG	800	**16.528 tCO$_2$e**
F. of Physical Education	LPG	280	
F. of Early Childhood Education	LPG	180	
F. of Law	LPG	240	
F. of Tourism & Hotels	LPG	180	
University administration	LPG	120	
University Housing	LPG	7,200	
	NG	279,258	**520.690 tCO$_2$e**
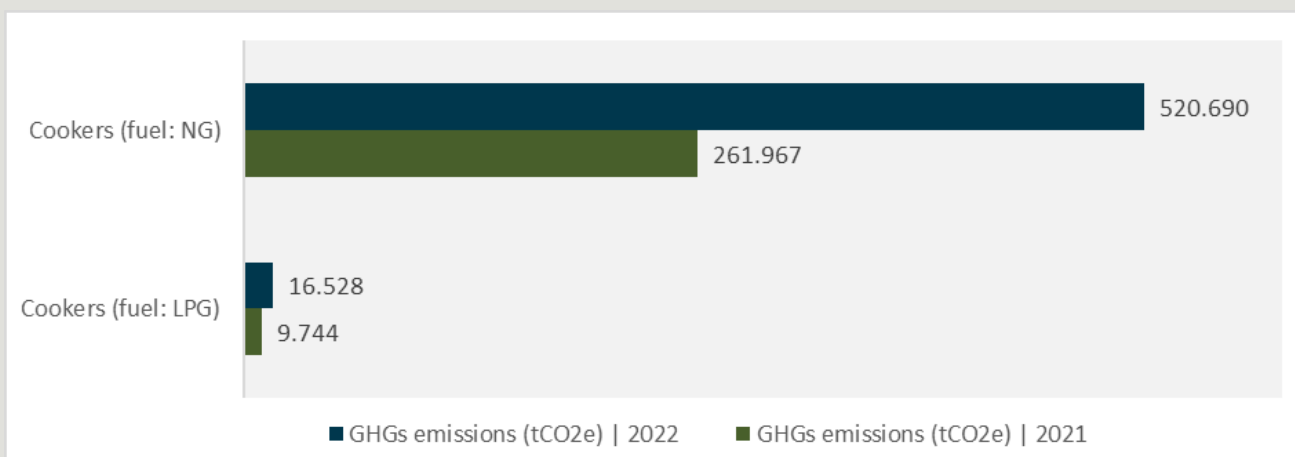
Figure 3-3 GHGs Emissions (tCO$_2$e) from cookers | USC | 2021 and 2022

3.1.4 Air Conditioners

In 2022, 135.62 kg of R22 and 65.8 kg of R410a leaked from air conditioners as shown in table (3-4) and increased carbon footprint of USC by **382.863 tCO$_2$e** (represent **22.2%** of scope I emissions in 2022). GHGs leakage from AC in 2022 decreased in comparison to 2021 report as shown in figure (3-4).

Table 3-4 GHGs leakage from ACs (tCO$_2$e) | USC | 2022

| Faculty/ Institute	Freon type	Consumption	GHGs Emissions
F. of Pharmacy	R22	Not reported	
F. of Veterinary Medicine	R22	Not reported	
FCAI	R22	Not reported	
GEBRI	R22	15	
ESRI	R22	76	
F. of Commerce	R22	28.2	
	R410a	65.8	
F. of Education	R22	4.5	**382.863 tCO$_2$e**
F. of Physical Education	R22	4.32	
F. of Early Childhood Education	R22	Not reported	
F. of Law	R22	1	
F. of Tourism & Hotels	R22	3.6	
University administration	R22	3	
University Housing	R22	Not reported	
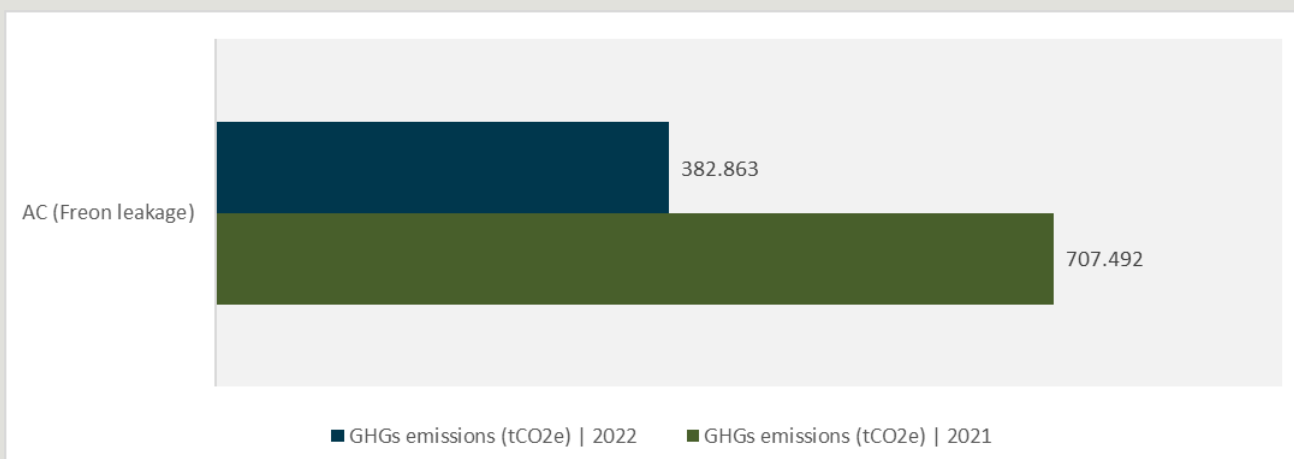
Figure 3-4 GHGs leakage from ACs (tCO$_2$e) | USC | 2021 and 2022

3.1.5 Agricultural tractors

In 2022, 4045 liters of diesel were consumed by agricultural tractors as shown in table (3-5) and increased carbon footprint of USC by **10.917 tCO₂e** (represent **0.6 %** of scope I emissions in 2022). GHGs emissions from tractors in 2022 were close to those reported in the 2021 as shown in figure (3-5).

Table 3-5 GHGs Emissions (tCO$_2$e) from agricultural tractors | USC | 2022

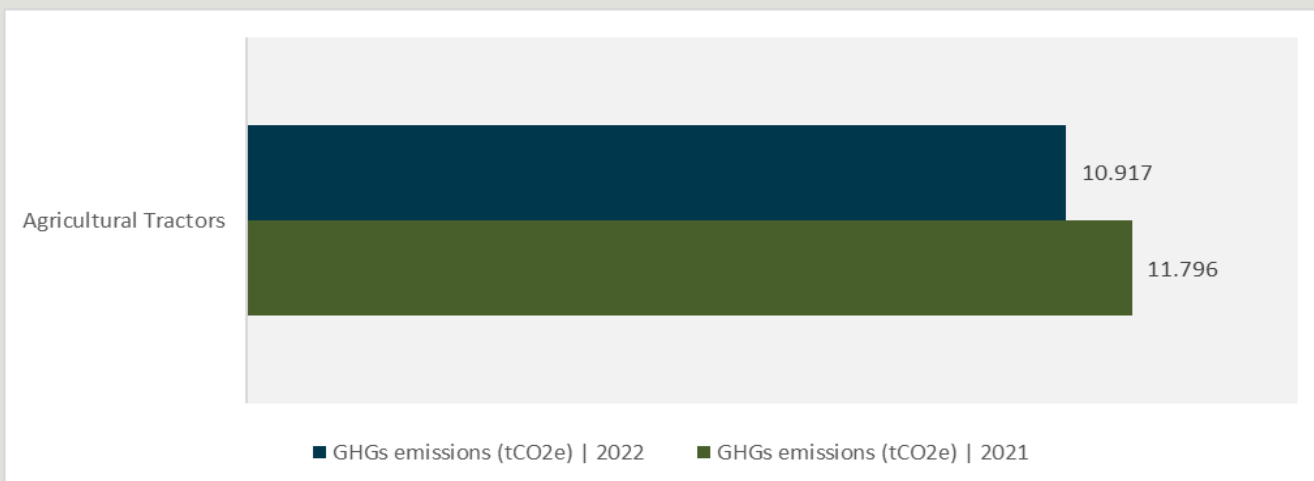| Faculty/ Institute	Diesel Consumption	GHGs Emissions
F. of Pharmacy	--	
F. of Veterinary Medicine	2600	
FCAI	--	
GEBRI	500	
ESRI	625	
F. of Commerce	--	
F. of Education	--	**10.917 tCO₂e**
F. of Physical Education	--	
F. of Early Childhood Education	--	
F. of Law	--	
F. of Tourism & Hotels	--	
University administration	320	
University Housing	--	

Figure 3-5 GHGs emissions from agricultural tractors (tCO$_2$e) | USC | 2021 and 2022

3.1.6 Synthetic fertilizers

In 2022, 3313 kg of fertilizers were consumed in the USC farms as shown in table (3-6) and caused emissions of N$_2$O equivalent to **3.49 tCO$_2$e** [*] (represent **0.2 %** of scope I emissions in 2022). GHGs emissions from fertilizers in 2022 decreased in comparison to those reported in the 2021 as shown in figure (3-6).

[*] In this report, Global Warming Potential (GWP) of N$_2$O = 273 (according to AR6 of IPCC) [11].

Table 3-6 GHGs emissions from used fertilizers (tCO$_2$e) | USC | 2022

| Faculty/ Institute	Fertilizer type	Consumption	GHGs Emissions
F. of Pharmacy	---	---	
F. of Veterinary Medicine	Urea (46.5% N)	1000	
	Monoammonium Phosphate (12% N)	25	
	Humic Acid (45% N)	5	
	Fulvic acid (3% N)	5	
	Magnesium sulphate (10.5% N)	25	
FCAI	---	---	
GEBRI	Ammonium Nitrate (33% N)	900	
	Urea (46.5% N)	750	
	Calcium Nitrate (12% N)	275	**3.49 tCO$_2$e**
ESRI	Calcium Nitrate (15.5% N)	75	
F. of Commerce	---	---	
F. of Education	---	---	
F. of Physical Education	---	---	
F. of Early Childhood Education	---	---	
F. of Law	---	---	
F. of Tourism & Hotels	---	---	
University administration	Humic Acid (45.5% N)	3	
	Ammonium Nitrate (46% N)	250	
University Housing	---	---	
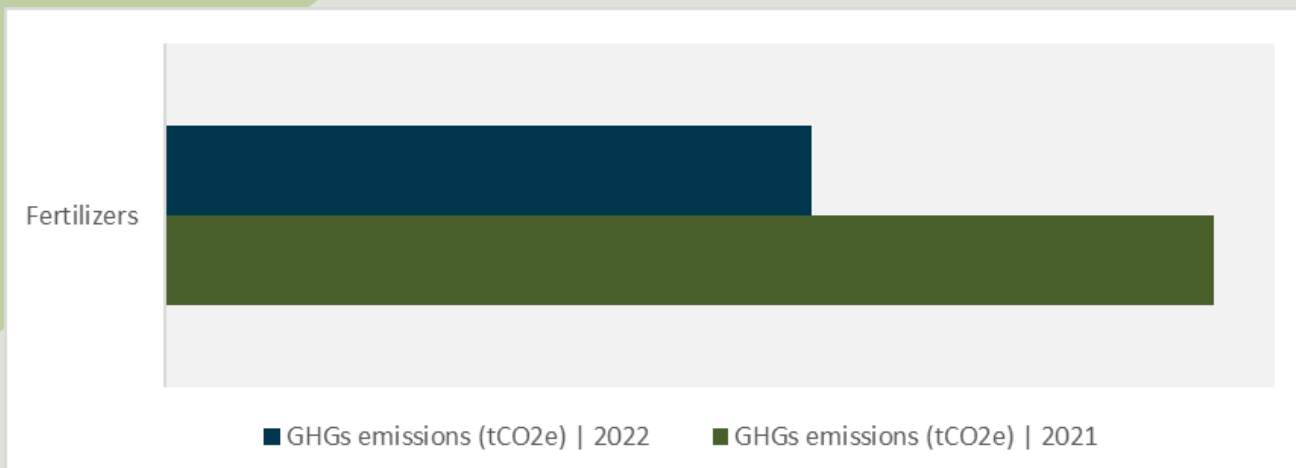
Figure 3-6 GHGs emissions from used fertilizers (tCO$_2$e) | USC | 2021 and 2022

3.1.7 Livestock

Methane (CH$_4$) is emitted as a by-product of the normal livestock digestive process. In 2022, **69.96 tCO$_2$e** (represent **4.1 %** of scope I emissions in 2022) were emitted from livestock in the farm of faculty of veterinary medicine as shown in table (3-7).

Note: Livestock data reported in this report (2022) for the first time.

Table 3-7 GHGs emissions related to livestock (tCO$_2$e) | USC | 2022

Faculty/ Institute	Livestock	Number	GHGs Emissions
F. of Veterinary Medicine	Camels	1	2591 kg CH$_4$ = **69.96 tCO$_2$e** [*]
	Buffaloes	17	
	Cows	39	
	Sheep	34	
	Goats	18	

[*] In this report, Global Warming Potential (GWP) of CH$_4$ for in 100 years = 27 (according to AR6 of IPCC) [11].

3.2 Scope II

3.2.1 Electricity Consumption

In 2022, total electricity consumption in USC reach to 3,430,927.43 kwh which represented about **1,777.220 tCO₂e**. Contribution of each faculty/ institute in scope II is shown in table (3-8). GHGs emissions from electricity consumption in 2022 increased in comparison to those reported in the 2021 as shown in figure (3-7).

Table 3-8 GHGs Emissions (tCO$_2$e) from electricity consumption | USC | 2022

Faculty/ Institute	Consumption (kwh)	GHGs Emissions
F. of Pharmacy	94,885.71	
F. of Veterinary Medicine	189,771.43	
FCAI	349,000.00	
GEBRI	524,652.00	
ESRI	109,001.00	
F. of Commerce	173,688.00	
F. of Education	83,350.00	**1,777.220 tCO₂e**
F. of Physical Education	149,172.00	
F. of Early Childhood Education	39,000.00	
F. of Law	136,674.00	
F. of Tourism & Hotels	243,019.00	
University administration	347,914.29	
University Housing	990,800.00	

Electricity Consumption
- 1777.220
- 1465.422

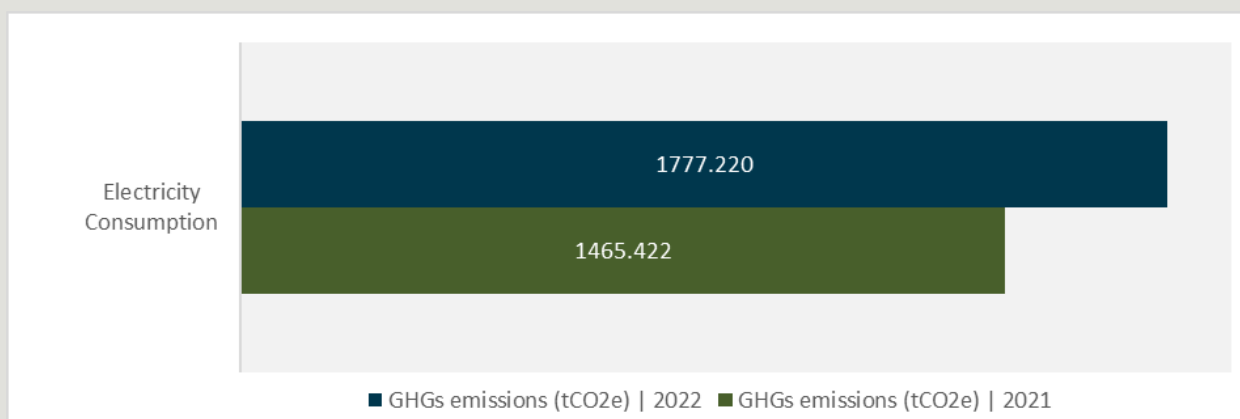■ GHGs emissions (tCO2e) | 2022 ■ GHGs emissions (tCO2e) | 2021

Figure 3-7 GHGs emissions from electricity consumption (tCO$_2$e) | USC | 2021 and 2022

3.3 Scope III

Scope 3 includes indirect emissions from activities related to the university. Its categories are shown in table (3-9). In 2022, scope III is calculated only for paper production and T&D loss.

Table 3-9 Included categories of Scope III in 2022 report

No.	Category	Status	2022 Report
1	Purchased goods and services	**partially calculated**	Paper production
2	Capital goods	not included	
3	Fuel-and-energy-related activities (Not included in Scope 1 or 2)	**partially calculated**	T&D loss
4	Upstream transportation and distribution	not included	
5	Waste generated in operations	not included	
6	Business travel	not included	
7	Employee commuting	not included	
8	Upstream leased assets	not relevant	
9	Downstream transportation and distribution	not relevant	
10	Processing of sold products	not relevant	
11	Use of sold products	not relevant	
12	End of life treatment of sold products	not relevant	
13	Downstream leased assets	not relevant	
14	Franchises	not relevant	
15	Investments	not relevant	

3.3.1 Paper Consumption

In 2022, 40.745 ton of paper were consumed according to reported data as shown in table (3-10). Production of that amount of paper emitted GHGs emissions up to **37.461 tCO₂e**. In addition, Yield of pulp/ pine tree assumed to be 530 kg, and hence **77 trees** were cut down in 2022 to produce this amount of paper.

Table 3-10 GHGs Emissions (tCO$_2$e) from paper consumption | USC | 2022

Faculty/ Institute	Consumption	GHGs Emissions
F. of Pharmacy	50000 (A4 sheets)	
F. of Veterinary Medicine	56500 (A4 sheets)	
FCAI	25000 (A4 sheets)	
	5000 (A3 sheets)	
GEBRI	100000 (A4 sheets)	
ESRI	75000 (A4 sheets)	
F. of Commerce	1806500 (A4 sheets)	
	48000 (A3 sheets)	
F. of Education	415000 (A4 sheets)	**37.461 tCO$_2$e**
	60000 (A3 sheets)	
	150000 (Exam booklets)	
F. of Physical Education	Not reported	
F. of Early Childhood Education	150000 (A4 sheets)	
F. of Law	350000 (A4 sheets)	
F. of Tourism & Hotels	20000 (A4 sheets)	
University administration	2500000 (A4 sheets)	
University Housing	125000 (A4 sheets)	

Note: Weight of A4 sheet assumed to be ≈ 5 g, A3 ≈ 10 g, and exam booklet ≈ 75 g.

3.3.2 T&D loss

Transmission, and distribution (T&D) loss in Egyptian electricity grid reach to 10.5% according to world bank. And hence, T&D related to electricity consumption in USC was **168.351 tCO$_2$e**.

04

SUMMARY

image: Freepik.com

4. SUMMARY

Carbon footprint of University of Sadat City was calculated for 2022. Scope I included university fleet, generators, cookers, air conditioners, agricultural tractors, synthetic fertilizers, and livestock. Scope II included electricity consumption only. Scope I & II was **3502 tCO₂e** (≈ 110 kg/student). Detailed contribution of each source is shown in figure (4-1). Compared to 2021, CFP (scope I & II) increased by 470 tCO₂e as shown in figure (4-2).
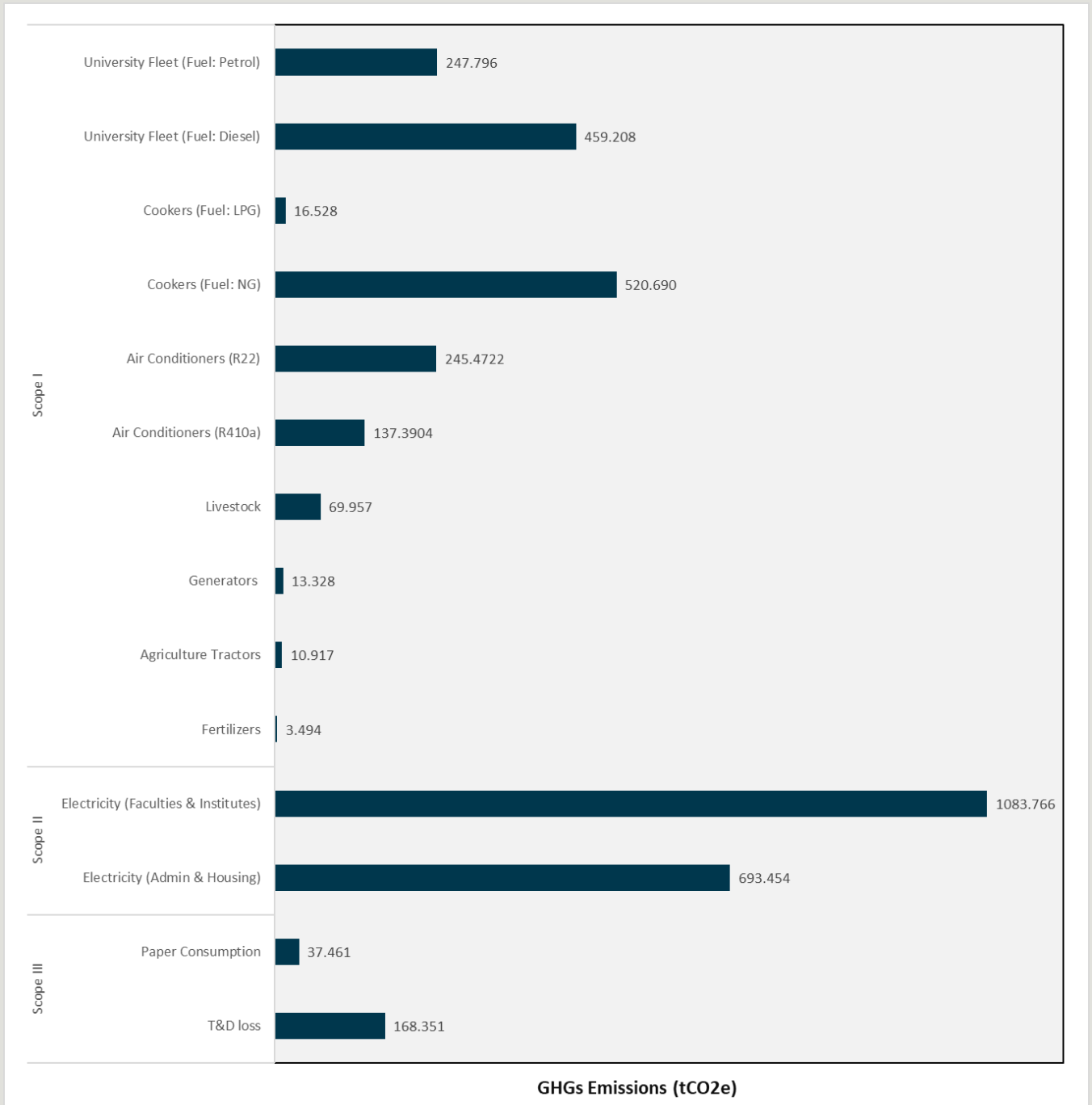

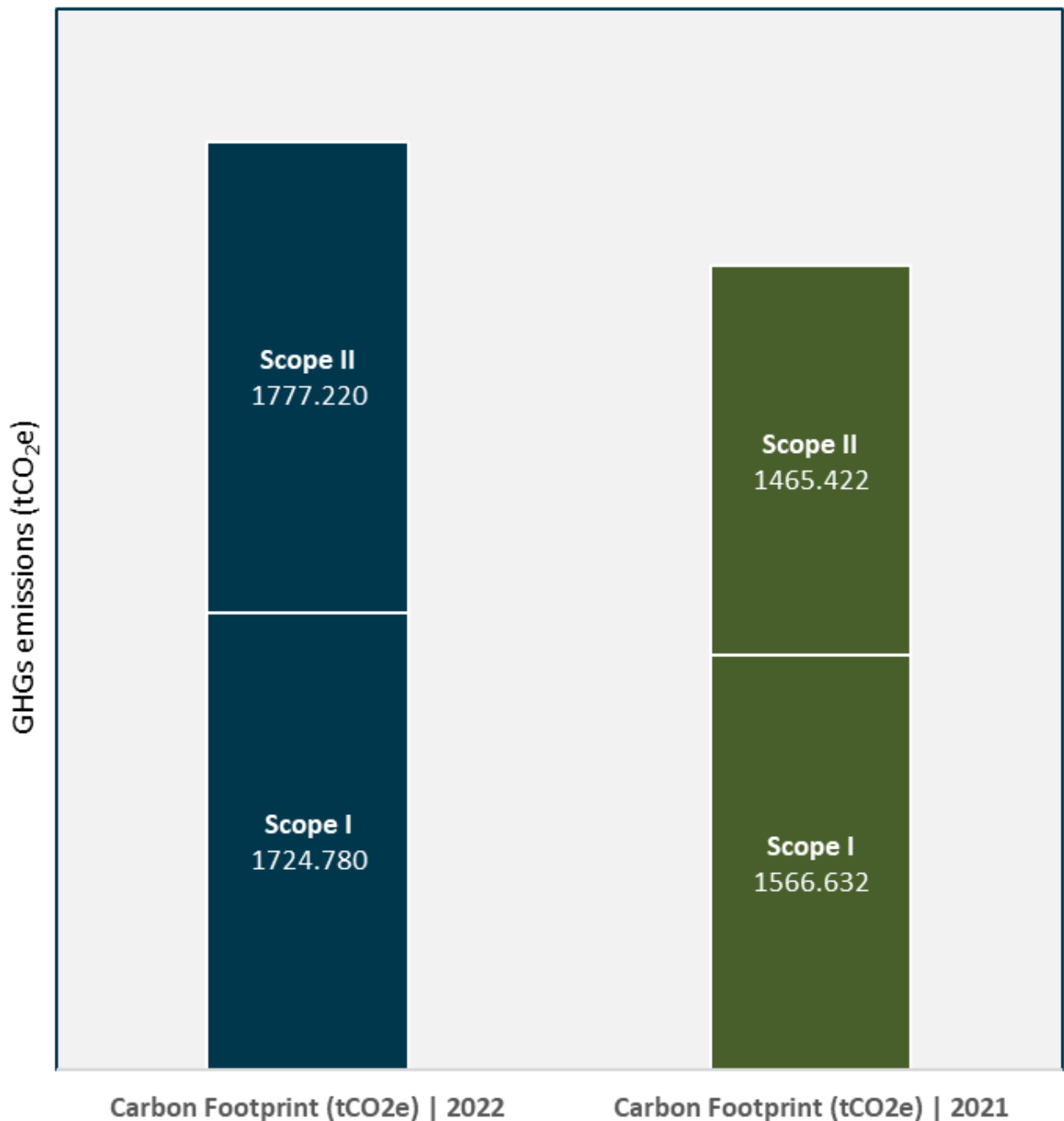**Figure 4-1** GHGs emissions from different sources (tCO₂e) | USC | 2022

Figure 4-2 Carbon Footprint of USC (tCO2e) in 2021 and 2022

To determine the contribution of each faculty/institute in the overall carbon footprint of USC, results were recollected for each college separately as shown in table (4-1), and figure (4-3).

The results showed that **university housing** had the highest carbon footprint in the university in 2022 (representing **30.0%** of the carbon footprint of the university), while **faculty of early childhood education** had the lowest carbon footprint in 2022 (represent **0.9%** of the USC carbon footprint) according to the reported data.

Table 4-1 Carbon footprint of each faculty/ institute | USC | 2022

| Faculty/ Institute | CFP (Scope I & II) | tCO2e | Percentage (%) |
|---|---|---|
| F. of Pharmacy | 66.92 | 1.9% |
| F. of Veterinary Medicine | 193.64 | 5.5% |
| FCAI | 193.18 | 5.5% |
| GEBRI | 309.58 | 8.8% |
| ESRI | 209.90 | 6.0% |
| F. of Commerce | 288.23 | 8.2% |
| F. of Education | 66.06 | 1.9% |
| F. of Physical Education | 98.86 | 2.8% |
| F. of Early Childhood Education | 32.01 | 0.9% |
| F. of Law | 83.45 | 2.4% |
| F. of Tourism & Hotels | 153.12 | 4.4% |
| University administration | 756.55 | 21.6% |
| University Housing | 1,050.50 | 30.0% |
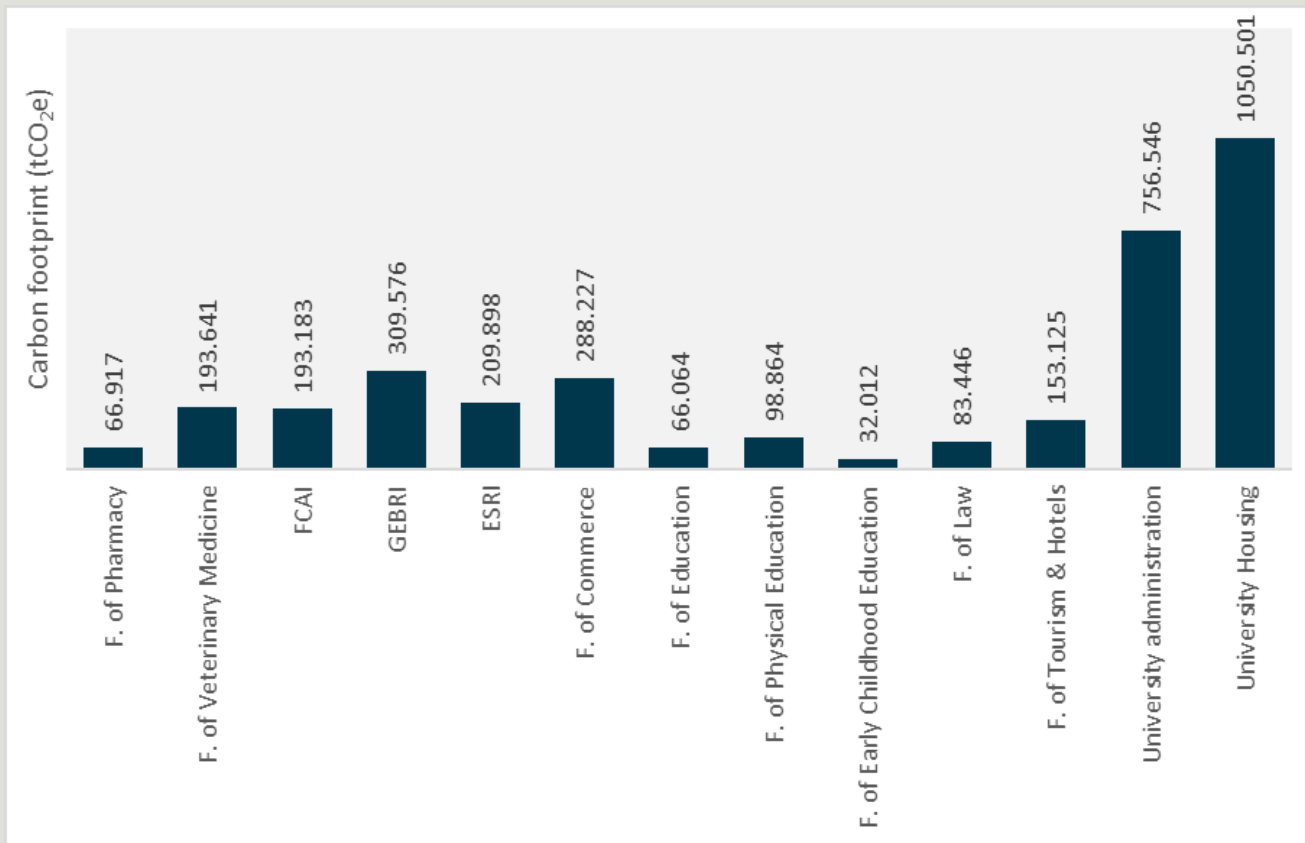
Figure 4-3 Carbon Footprint of each faculty/ institute | USC | 2022

05
MITIGATION PLAN

5. MITIGATION PLAN

5.1 Carbon Reduction Projects & Strategies

5.1.1 Fuel Consumption

Achieved Targets:

- The university administration received **4** new private cars that run on natural gas instead of petrol.

5.1.2 Freon Leakage

Reported Targets:

- 800 AC that operate with R22 freon will be replaced within 5 years (2024-2028).
- Cost: 9,410,000 Egyptian pounds
- Benefit: avoiding freon leaks resulting from old AC (= 382.9 tCO_2e in 2022).

5.1.3 Electricity Consumption

Adopted strategies:

- Increase reliance on natural light.
- Power off all light sources and instruments after official working hours.

Reported Targets:

- Use LED bulbs instead of incandescent bulb as shown in figure (5-1).
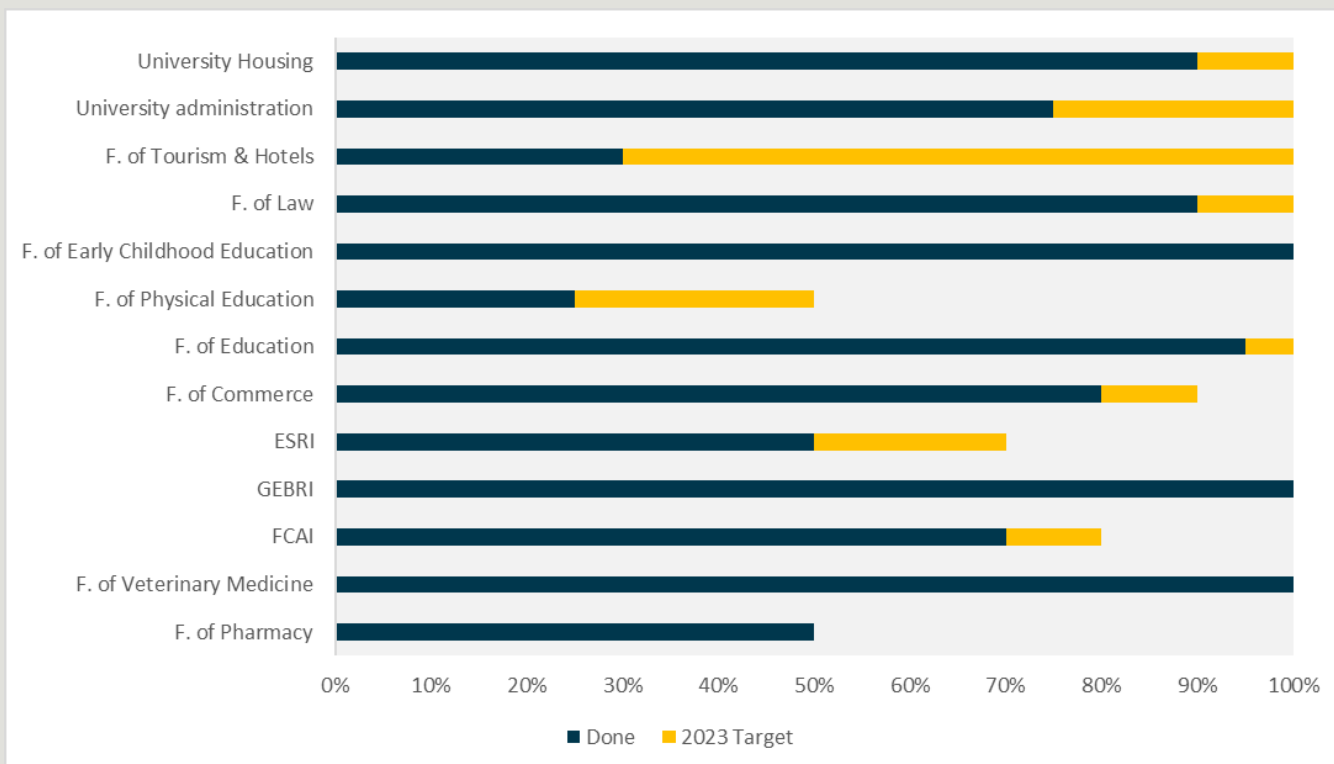

Figure 5-1 achieved and reported targets for bulb replacement | USC | 2022

- By the end of 2025, 3,000 LED bulbs will have been purchased instead of normal bulbs.
- Cost: 320,000 Egyptian pounds
- Benefits: These 3000 LED bulbs consumption assumed to be reaches 35,100 kw annually instead of 295,500 kw annually (for normal bulbs), which means reducing GHGs emissions by **134.9 tCO$_2$e annually**.

5.1.4 Paper Consumption

Adopted strategy (Digital transformation):

- Electronic communication instead of printed letters.
- Electronic archiving of meetings on university website.
- Gradual shift towards electronic tests.

Reported Targets:

- Faculty of Commerce: **30%** reduction ▼
- Faculty of GEBRI: **10%** reduction ▼
- Faculty of Veterinary Medicine: **25%** reduction ▼
- University Housing: **70%** reduction ▼
- Faculty of Early Childhood Education: **17%** reduction ▼

5.2 Carbon Avoidance Projects

Achieved Targets:

- Two solar energy stations have been established, one of them is 75 kW and the other 1 kw in the 100 feddan area of the university at a cost of 1,000,000 Egyptian pounds.
- This solar station generates 100,000 kWh per year (**51.8 tCO$_2$e avoided annually**).

Figure 5-2 installed solar panels

Reported Targets:

- Faculty of Pharmacy will install new 10 solar panels.
- Faculty of Education will install new 10 solar panels.

5.3 Carbon Removal Projects

Over one year a mature tree will take up about 22 kilograms of carbon dioxide from the atmosphere [12]. There are already **3,172 trees** in USC faculties and institutes that absorb **69.784 tCO$_2$** of air annually, and USC aims by the end of 2023 to plant **1,295 trees**, bringing the total GHGs removed from the air to **98.274 tCO$_2$** annually. The following table shows the achieved and reported targets for each faculty/institute.
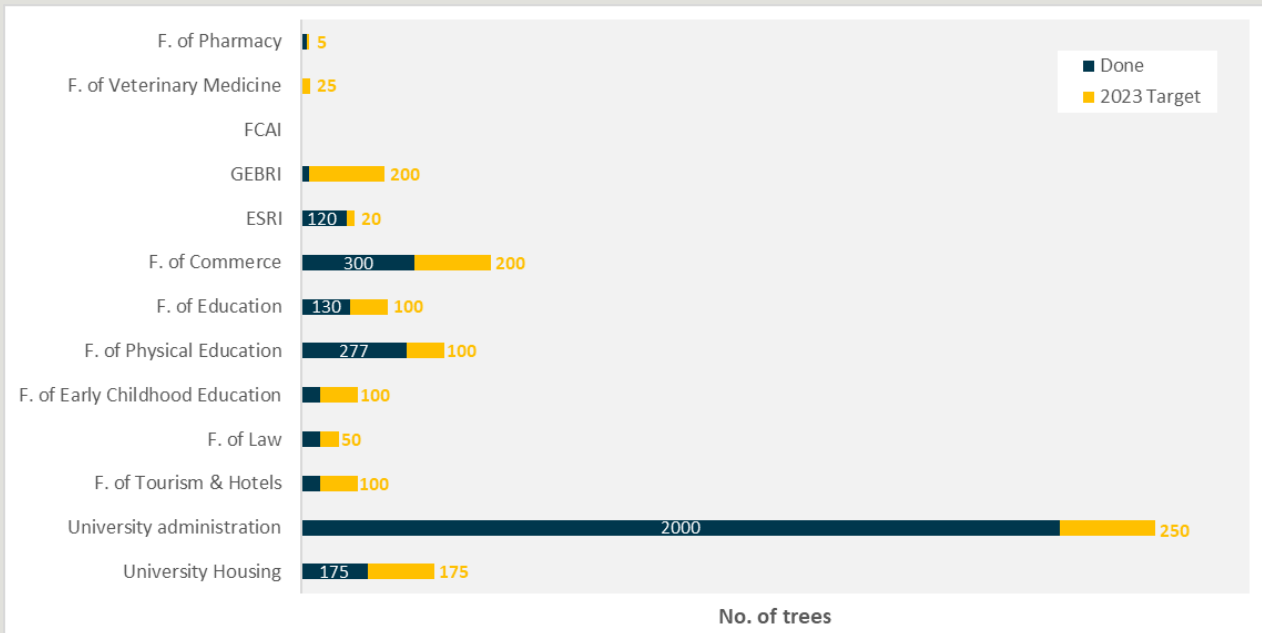

Figure 5-3 Achieved (2022) and reported targets (2023) for trees planting | USC

Figure 5-4 one of the university's reforestation campaigns

6. REFERENCES

(1)   IPCC, (2013). **Climate Change 2013: The Physical Science Basis.** Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

(2)   IPCC, (2014). **Climate Change 2014: Impacts, Adaptation, and Vulnerability.** Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1132 pp.

(3)   The Carbon Trust, (2007). **Carbon foot printing, An introduction for organizations.**

(4)   World Resources Institute & World Business Council for Sustainable Development, (2013). **Technical Guidance for Calculating Scope 3 Emissions.**

(5)   Department for Energy Security and Net Zero and Department for Business, Energy & Industrial Strategy, (2022). **UK Government GHG Conversion Factors for Company Reporting**. https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2022

(6)   IPCC (2006), **2006 IPCC Guidelines for National Greenhouse Gas Inventories**, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T., and Tanabe K. (eds). Published: IGES, Japan.

(7)   IPCC. **Emission Factor Data Base (EFDB 2020)** software.

(8)   World Bank, (2018). **Electric power transmission and distribution losses (% of output).**

(9)   USEPA, **Ozone-Depleting Substances**. https://www.epa.gov/ozone-layer-protection/ozone-depleting-substances

(10)   USEPA, **Phaseout of Class II Ozone-Depleting Substances.** https://www.epa.gov/ods-phaseout/phaseout-class-ii-ozone-depleting-substances

(11)   IPCC, 2021: **Climate Change 2021: The Physical Science Basis**. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 2391 pp.

(12)   EEA, **Trees help tackle climate change**. https://www.eea.europa.eu/articles/forests-health-and-climate-change/key-facts/trees-help-tackle-climate-change

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