



# **Greenhouse Gas (GHG) Accounting**

January–December 2023 (FY2023)

# Executive Summary

This report provides a summary of the greenhouse gas (GHG) emissions produced by American University of Sharjah (AUS) operations from January 1 to December 31, 2023 (FY2023). AUS is a private university in the United Arab Emirates (UAE), founded in 1997 by His Highness Sheikh Dr. Sultan bin Mohammed Al Qasimi, Member of the Supreme Council of the United Arab Emirates and Ruler of Sharjah. The university has close to 8,000 stakeholders, including students, staff, faculty and their dependents residing on campus.

As part of the initial launch of the Climate Action Plan in 2022, AUS worked with South Pole, a third-party service provider, to conduct an initial GHG study baselining AUS' annual emissions and setting Science Based Targets Initiative (SBTi)-aligned reduction targets. After the first reporting cycle, it became apparent that further efforts had to be made on closing existing data gaps and improving data quality. The AUS Office of Sustainability has been working with internal stakeholders to continuously improve data collection for the annual AUS GHG report.

Since 2023, AUS has been using the reporting tool eMission by the UAE Alliance for Climate Action (UACA) to track and report its annual GHG emissions across all three scopes to better align with UAE reporting standards. A summary of key performance indicators is presented in Table 1.

*Table 1: Summary of key performance indicators*

<b>Number of stakeholders</b>	<b>7,957</b>
<b>Premises area (m<sup>2</sup>)</b>	<b>363,728.27</b>
<b>tCO<sub>2</sub>e/stakeholders</b>	<b>6.88</b>
<b>tCO<sub>2</sub>e/m<sup>2</sup></b>	<b>0.15</b>

tCO<sub>2</sub>e: Tonnes of Carbon Dioxide Equivalent

Table 2 shows the year-on-year GHG emissions by source from 2023 (January–December 2023).

Table 2: GHG emissions for 2023

Scope	Emissions (tCO <sub>2</sub> e)
Scope 1: Direct GHG emissions	2467
Scope 2: Indirect GHG emissions from purchased electricity	28,598
Scope 3: Other indirect GHG emissions	23,664
Total GHG emissions	54,729

In Figure 1, the percentage shares of the scopes can be seen. Scope 2 contributed the majority of GHG emissions from AUS operations in FY2023, accounting for 52 percent. Figure 2 shows that purchased electricity contributed 28,598 tCO<sub>2</sub>e to AUS total footprint of 54,729 tCO<sub>2</sub>e for this period.

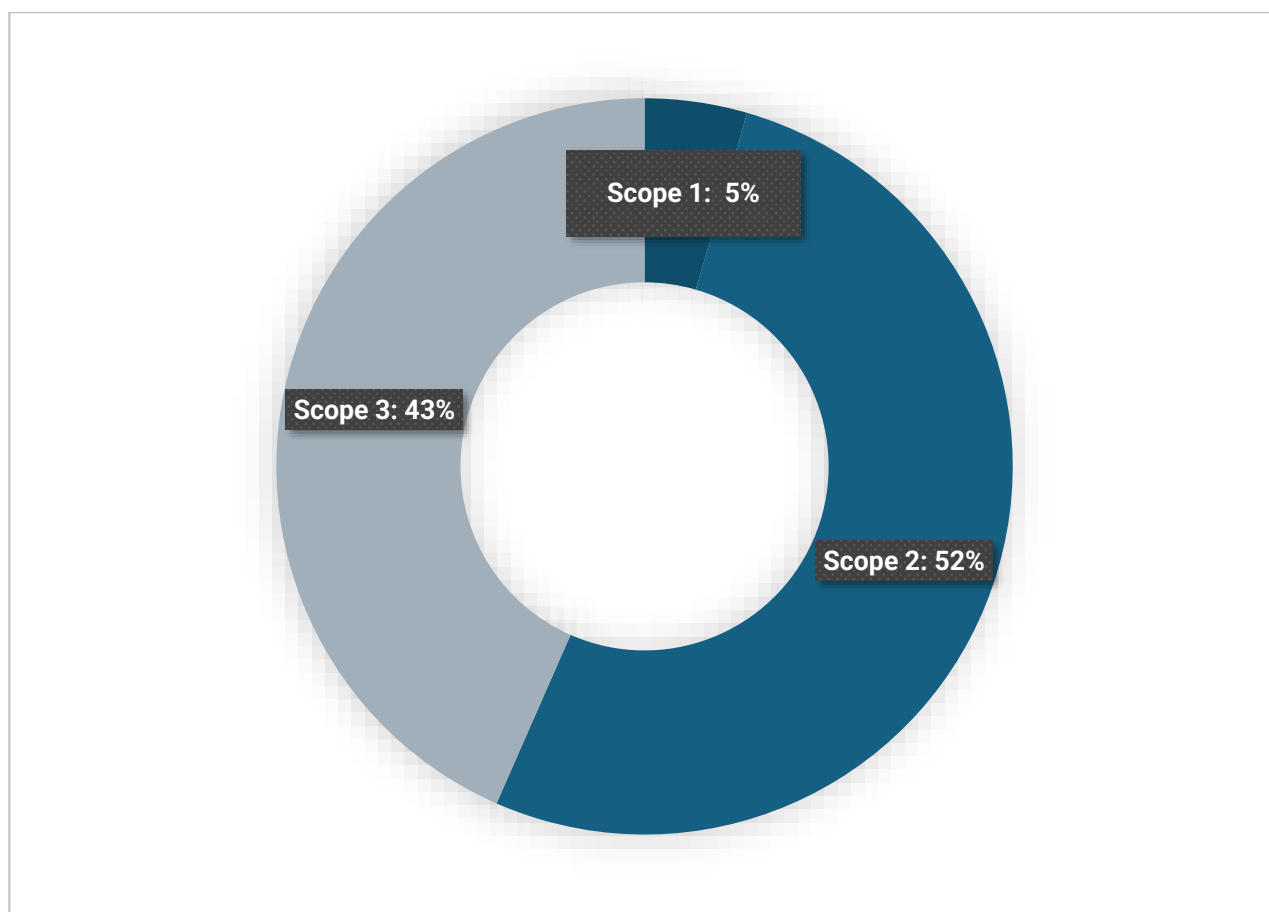


Figure 1: Scope 1, 2 and 3 emissions by percentage of total emissions in FY2023

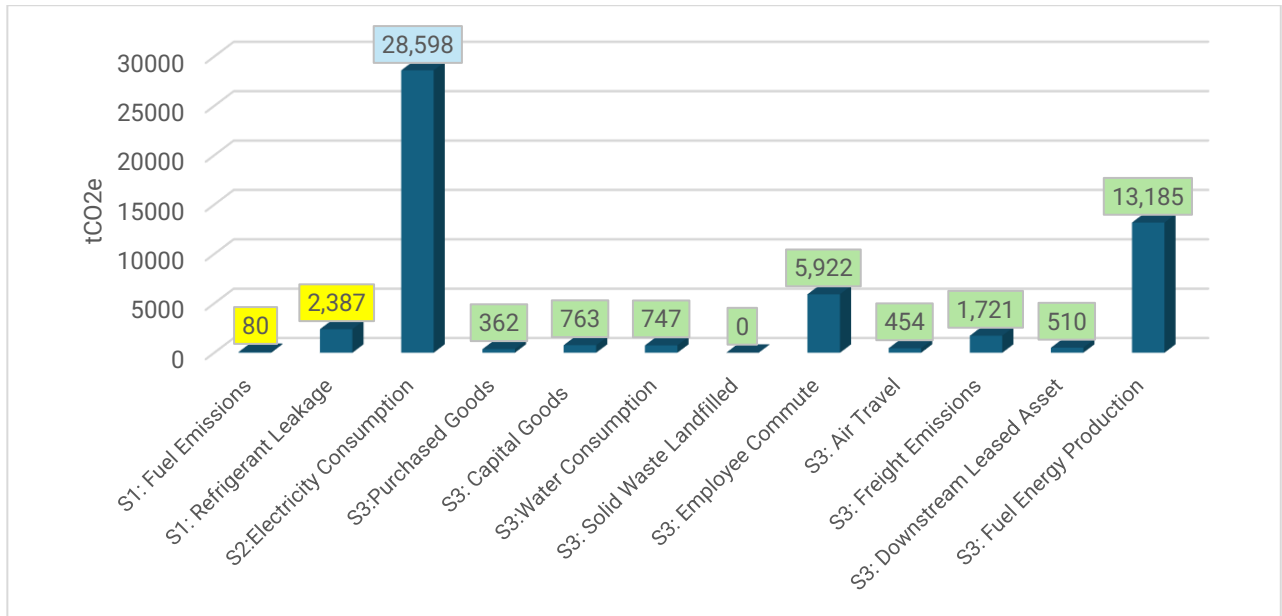


Figure 2: Scope 1, 2 and 3 emissions by category in FY2023

# Introduction

This report provides a summary of the greenhouse gas (GHG) emissions produced by American University of Sharjah (AUS) operations from January 1 to December 31, 2023. AUS was founded in 1997 by His Highness Sheikh Dr. Sultan bin Mohammed Al Qasimi, Member of the Supreme Council of the United Arab Emirates (UAE) and Ruler of Sharjah. Sheikh Sultan articulated his vision of a distinctive institution against the backdrop of Islamic history and in the context of the aspirations and needs of contemporary society in the UAE and the Gulf region. The university has close to 8,000 stakeholders, including students, staff, faculty and their dependents residing on campus. With this GHG accounting report, AUS aims to gain insights into the quantity of GHG emissions caused by its operations. This is the fourth report of GHG calculations. However, this report is based on the eMission platform created by UACA. The previous three reports were done by South Pole.

Table 3: University information

Website	www.aus.edu
Business area	Private University, Education
Reporting period	January 1, 2023–December 31, 2023

## Methodology

The GHG accounting and reporting procedure is based on the *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard– Revised Edition* (the GHG Protocol) and the complementary *Corporate Value Chain (Scope 3) Accounting and Reporting Standard*, which are the most widely used international accounting tools for government and business leaders to understand, quantify and manage GHG emissions. The standards were developed in a partnership between the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD).

## System Boundaries

### Organizational Boundaries

The system boundaries for the GHG accounting procedure were defined by the control approach, i.e., covering all entities where AUS has operational control. Table 4 shows the key figures relevant for the performance indicator of AUS.



Table 4: Key figures for performance indicators at AUS

<b>Region</b>	UAE
<b>Number of facilities</b>	1
<b>Status</b>	Owned
<b>Area (m<sup>2</sup>)</b>	363,728.27
<b>Head count (includes students, faculty, staff and their dependents residing on campus)</b>	7,957

## Operational Boundaries

Under the GHG Protocol, emissions are divided into direct and indirect emissions. Direct emissions originate from sources either owned or controlled by the reporting entity, while indirect emissions are generated by the reporting entity's activities, but which occur at sources owned or controlled by another entity. Each emission type is divided into three scopes, as found below.

### Scope 1

Scope 1 includes all carbon emissions that can be directly managed by the organization (i.e., direct GHG emissions). This includes emissions from the combustion of fossil fuels in mobile and stationary sources (e.g., owned or controlled boilers, power generators and vehicles), carbon emissions generated by chemical and physical processes, and fugitive emissions from the use of cooling and air conditioning equipment. Table 5 gives an overview of the emission sources considered in Scope 1.

Table 5: Overview of the emission sources for Scope 1

<b>Category</b>	<b>Emission Sources</b>	<b>Boundary</b>
Emissions from stationary combustion	Generation of electricity and heat	Included and is under fuel emissions but LPG is not included
Emissions from mobile combustion	Company-owned or leased vehicles	Included and is under fuel emissions
Process emissions	Manufacture or processing of	Not applicable

	chemicals and materials	
Fugitive emissions	Emissions from the use of cooling systems and air conditioning equipment, leakage from CO2 tanks or methane tubes	Included under refrigerant leakage (the refrigerants R134A, R407C and R32 were used by AUS but were not accounted for in this report)

## Scope 2

Scope 2 includes indirect GHG emissions from the generation of electricity, steam, heat or cooling purchased by the organization from external energy providers. Table 6 gives an overview of the emission sources considered in Scope 2.

*Table 6: Overview of the emission sources for Scope 2*

Category	Emission Sources	Boundary
Electricity	Purchased electricity	Included
Steam	Purchased steam	Not applicable
District heating	Purchased district heating	Not applicable
District cooling	Purchased district cooling	Not applicable

## Scope 3

Scope 3 includes other indirect emissions, such as emissions from the extraction and production of purchased materials and services, vehicles not owned or controlled by the reporting entity, outsourced activities and waste disposal, among others. According to the GHG Protocol, companies shall separately account for and report on emissions from Scopes 1 and 2. Scope 3 is an optional reporting category, but as it is often the most important scope for many organizations, companies are expected to at least assess the relevant categories. Table 7 gives an overview of the emission sources considered in Scope 3.

*Table 7: Overview of the emission sources for Scope 3*

Category	Emission Sources	Boundary
Purchased goods and services	Purchased goods (raw materials) and services	Included (water consumption is considered as a separate category unlike previous reports)
Capital goods	Production of capital goods (e.g., machinery and IT equipment)	Included
Fuel- and energy-related activities	Upstream life cycle emissions from fuel and electricity generation, including transmission and distribution losses	Included
Upstream transportation and distribution	Transportation and distribution of goods and services to the company	Included under freight emissions
Waste generated in operations	Waste management of operational waste (landfilling, recycling, etc.)	Included but eMission only looks at landfilling and so emissions from recycling are not included in this report
Business travel	Travel and accommodation of employees	Included (rented/leased vehicles are now a separate category unlike previous reports)
Stakeholder commuting	Stakeholders travel between home and work	Included under employee commute
Upstream leased assets	Operation of assets leased by the organization (lessee) in the reporting year and not included in Scopes 1 or 2	Not applicable



Downstream transportation and distribution	Transportation and distribution of products sold by the organization	Not applicable
Processing of sold products	Processing of intermediate products sold by the organization	Not applicable
Use of sold products	Use of sold goods that require energy to operate	Not applicable
End-of-life treatment of sold products	Waste disposal and treatment of sold products	Not applicable
Downstream leased assets	Operation of assets owned by the company (lessor), leased to other entities, and not included in Scopes 1 or 2	Applicable (In this report the emissions for leased/rented vehicles not owned by AUS are accounted for under downstream leased assets as the UACA platform does not have a category for upstream leased assets)
Franchises	Operation of franchises not included in Scopes 1 or 2	Not applicable
Investments	Operation of investments not included in Scopes 1 or 2	Not applicable

# Data Inventory and Assumptions

Overall, the data inventory, emission factors and assumptions are based on the GHG Protocol. The assumptions and emission factors were selected using a conservative approach (appendices 1 and 2). Unless otherwise specified, all emission values in this report are given in tCO<sub>2</sub>e.

## Global Warming Potential

Global warming potential (GWP) is a measure of the climate impact of a GHG compared to carbon dioxide over a time horizon. GHG emissions have different GWP values depending on their efficiency of absorbing long-wave radiation and the atmospheric lifetime of the gas. The GWP values used in GHG accounting include the six GHGs covered by the United Nations Framework Convention on Climate Change and Kyoto Protocol, and blends from these. These are the GWP values used by the Department for Business, Energy and Industrial Strategy (BEIS) of the United Kingdom and are based on the Intergovernmental Panel on Climate Change's (IPCC's) *Fourth Assessment Report (AR4)* and *Fifth Assessment Report (AR5)*. The GHG Protocol recommends the use of AR5 but does not prohibit the use of previous assessment reports. The table below shows the GWP used in this report.

Table 8: GWP used in GHG assessment

Category	AR4 GWP (100 years)	AR5 GWP (100 years)
Carbon dioxide (CO <sub>2</sub> )	1	1
R407A (refrigerant)	-	1,923
R410A (refrigerant)	-	1,924
R22 (refrigerant)	-	1,760

(Source: GHG Protocol, 2013)

# Results

## Overall Results

Total emissions in this report refers to the emissions sources covered, as described in the system boundaries section. *Please note that due to rounding of numbers, the figures may not add up exactly to the total provided.*

The table below provides a breakdown of GHG emissions by scope and source. It describes the consumption and emissions in FY2023.

Table 9: GHG emissions by scope and activity for FY 2023

Activity	Consumption	Unit	Emissions (tCO <sub>2</sub> e)
<b>Scope 1: Direct GHG emissions</b>			<b>2,467</b>
<i>Fuel emission</i>			<b>80</b>
Diesel consumption	1,801	L	4.7 (stationary combustion= 3.5 tco2e and mobile combustion= 1.2 tco2e)
Petrol consumption	31,498	L	75.6
Refrigerant leakage	1,339	Kg	<b>2,387</b>
<b>Scope 2: Indirect GHG emissions from purchased electricity</b>			<b>28,598</b>
<i>Electricity consumption</i>	70,769,963	Kwh	28,598.1
<b>Scope 3: Other indirect GHG emissions</b>			<b>23,664</b>
<i>Category 1: Purchased goods and services</i>			<b>362</b>
Food and beverage	1,288,748	AED	93.6
Paper products	14,951	AED	1.7

Print media and printing support	385,180	AED	23.5
Lights and light fixtures, switch boards, transformers and home appliances	209,134	AED	8.2
On-road vehicles (excluding motorcycles) and accompanying parts	6,433	AED	0.3
Furniture and shelving	1,108,036	AED	34.4
Medical supplies, entertainment and sporting goods, fashion goods, advertising products	160,000	AED	3.8
Media, literature and software	758,178	AED	8.6
Data processing, internet publishing and other information services	85,24,455	AED	186.4
Hotels and campgrounds	45,033	AED	1.8
<i>Category 2: Capital goods</i>	22,651,450	AED	<b>763</b>
Construction	9,804,932	AED	627.4
Computer and electronic products	12,846,518	AED	135.3
<i>Category 3: Water consumption</i>	60,526,939	IG	<b>747</b>

<i>Category 4: Solid waste landfilled</i>	0	kg	<b>0</b>
<i>Category 5: Employee/stakeholder commute</i>			<b>5,922</b>
Metro	164	km	13.6
Car petrol	30,475,326	km	5,285.3
Public bus	17,294	km	622.6
<i>Category 6: Air Travel</i>			<b>454</b>
Short haul ( < 500 kilometers)	2,664	km	454.1
Medium haul (>= 500 kilometers, < 3700 kilometers)	295,701	Km	
Long haul (>= 3700 kilometers)	2,764,600	Km	
<i>Category 7: Freight emissions</i>			<b>1,721</b>
Air			3.3
Sea freight	49,920	Tkm	0.2
Road freight emissions			1717.7
<i>Category 8: Downstream leased asset</i>	193,302	L	<b>510</b>

<i>Category 9: Fuel energy production</i>			13185
Fuel consumption	5,948	AED	13184.5
Electricity consumption	15,427,923	AED	
<b>Total Emissions (Scope 1, 2 and 3)</b>			<b>54,729</b>

AUS's major emission sources are Scope 2 purchased electricity (28,598 tCO<sub>2</sub>e), Scope 3 fuel-and energy-related activities (13,185 tCO<sub>2</sub>e), and Scope 3 employee commuting (5922 tCO<sub>2</sub> e).

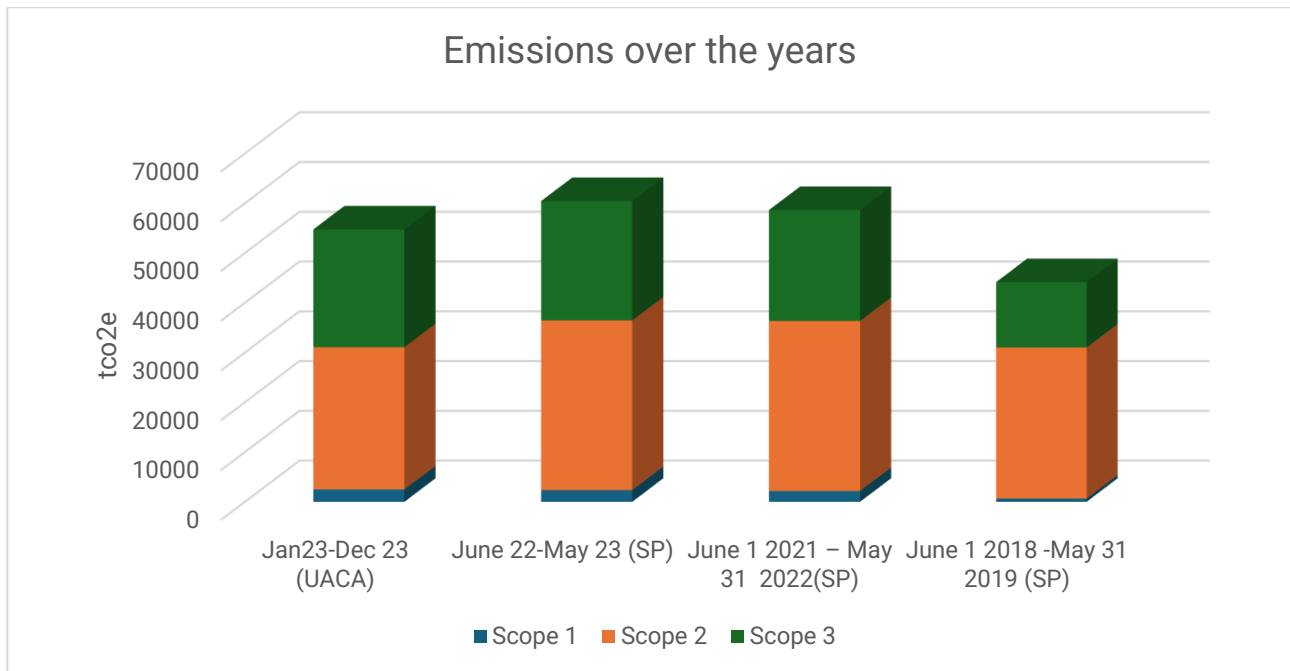
## Comparisons of FY2019, FY2022 and FY2023 GHG Emissions

When comparing between scope emissions for the different reporting periods, we see that the last three reports have been relatively consistent. The only significant change was for Scope 2 in the reporting period January 1–December 31, 2023. The reason for this change was because an emission factor for DEWA was used this time as opposed to an international emissions factor. Table 10 and figure 3 provide an overview of emissions over the years. Table 11 is a more detailed breakdown and comparison between the FY2023 reports for eMission (UACA) and South Pole.

*Table 10: Comparisons of scope emissions for FY2019, FY2022 and FY2023*

	eMission	South Pole	South Pole	South Pole
	<b>Jan 1, 2023–Dec 31, 2023</b>	<b>June 1, 2022–May 31, 2023</b>	<b>June 1, 2021–May 31, 2022</b>	<b>June 1, 2018–May 31, 2019</b>
<b>Scope 1</b>	2,467	2,357	2,150	633
<b>Scope 2</b>	28,598	34,082	34,189	30,372
<b>Scope 3</b>	23,664	23,986	22,280	13,122





**Figure 3: Emissions over the years**

Table 11: Comparisons between emissions(tco2e) for FY2023 eMission UACA and FY2023 South Pole (SP)

	eMission Jan 1, 2023– Dec 31, 2023	South Pole June 1, 2022–May 31, 2023	Comparison
<b>Scope 1</b>	2,467	2,357	
<b>Fuel emissions (UACA)</b> (Stationary + mobile consumption (South Pole))	80	505	SP includes LPG; UACA doesn't have it on its platform. Also, for 2023 we do not have LPG values as the Student Center was under renovation, thus a lower value.
Refrigerants	2,387	1,852	A greater quantity of refrigerants was used in 2023.
<b>Scope 2</b>	28,598	34,082	Electricity consumption was relatively the same but the emission factor which was used was different. eMission uses a DEWA emission factor. SP uses an international emissions factor.
<b>Scope 3</b>	23,664	23,986	
Purchased goods and services	362	1,118	SP is higher because it includes water consumption in its purchased goods unlike UACA, which has it as a separate category.
Capital goods	763	2,637	Construction costs were higher in 2022.

Water consumption	747	Part of purchased goods and services	Water consumption was higher in the SP report however emissions higher in UACA. This is again to do with the emissions factor being higher in eMissions as it's based on the UAE standards not international standards.
Solid waste landfilled	0	0	Sharjah waste is not landfilled.
Stakeholder commute	5,922	7,161	The UACA platform only accounts for car, metro and public bus.
Business travel/ Air travel	454	862	Rented vehicles and accommodation are also accounted for under this for SP, hence the value is bigger. In UACA accommodation is under purchased goods.
Upstream transportation and distribution (freight)	1,721	79	Heavier freight distribution in 2023.
Downstream leased asset	510	Part of business travel	In SP the value is 277.98 tco2e. Despite the spend being higher for SP, the emissions are less; this is due to the difference in emissions factor.
Fuel energy Production	13,184	12,085	Relatively similar

# Conclusions

Since the launch of AUS' Climate Action Plan in 2022, AUS has reported its GHG emission annually. The reported data quality and quantity has improved significantly over the years; however, there are still remaining data gaps that need to be addressed in collaboration with internal and external stakeholders.

The improvements in data quality and quantity initially lead to an increase in emissions across all three scopes but eventually plateaued for Scopes 1 and 2.

This is the first report based on the carbon emissions tool eMissions created by UACA. Both South Pole's and UACA's methodologies are based on the GHG protocol; however, UACA uses local emissions factors, which makes the results more accurate and relevant to the region.

By using local emissions factors, our Scope 2 emissions have decreased by 16 percent, even though AUS electricity consumption remained relatively stable.

As a result of these findings, it has become apparent that AUS' initial Climate Action Plan needs to be updated to refine emission reduction initiatives across all scopes.

# Appendix 1 – Assumptions

Solid waste landfilled: In Sharjah, the waste is incinerated or recycled (UACA doesn't have this option on the platform) therefore the value for waste landfilled is 0 kg for this report.

Road freight emissions: Any road freights whereby distance was reported as Sharjah to Sharjah. The distance was assumed to be from Sharjah to American university of Sharjah (using Google Maps). Additionally, it was assumed that the vehicles were heavy good vehicles (HGV) Rigid (>3.5 - 7.5 tonnes).

Fuel and energy production: The rate used to convert electricity into monetary terms is 0.218001 AED/kwh.

Electricity consumption: The readings for faculty housing for March 2023 to December 2023 were unavailable and therefore the values for March 2022 to December 2022 were used instead.

Refrigerants: Only R-410A and R-22 were accounted for as they are the refrigerants available on the UACA platform. The refrigerants R134A, R407C and R32 were used by AUS but were not accounted for in this report

Air travel: To calculate distance in miles, [www.airmilescalculator.com](http://www.airmilescalculator.com) was used.

Hotels and campgrounds (purchased goods and services): The cost of accommodation was estimated based on average hotel costs in the specified time frame.

Stakeholder commute: Same numbers used by South Pole in the FY2023 report as the data is based on the same survey. Actual data was collected for 2,511 stakeholders who commute by car and those who use AUS-Dubai Metro shuttle. In addition, AUS also identified 2,849 stakeholders who lived in the university area in FY2023 where they are assumed to use modes of commuting with no emission (walking or bicycle). The modes of commuting for the remaining stakeholders (2,152 head) are projected based on the commuting survey conducted by AUS. The total number of respondents of the survey was 231 with 1 excluded respondent due to unclear responses. The survey provided questions related to mode of transportation and total distance for commuting. Extrapolation was conducted to represent stakeholders who were commuting by taxi and local bus. The emission factors used were those provided by UACA and are mentioned in the tables above.

## Appendix 2 – Emission Factors

Category	Factor used in eMission	Source	Factor used by SP	Source
Fuel emission	Petrol/ gasoline: 0.0024 tCO <sub>2</sub> e/ liter  Diesel: 0.00264 tCO <sub>2</sub> e/ liter	IPCC 2006 default values (this also applies to downstream leased asset)	Petrol: 0.0027 tco <sub>2</sub> e/ liter  Diesel: 0.0023t co <sub>2</sub> e/ liter	BEIS, 2022
Refrigerant leakage	N/A	N/A	N/A	BEIS, 2022
Electricity consumption	0.4041 tco <sub>2</sub> e/ MWh	DEWA - Grid Emission Factor 2023	0.53 tco <sub>2</sub> e/ MWh	IEA, 2022
Purchased goods	Based on spend value	N/A	N/A	Amazon 2021 BEIS 2022 CEDA6 Ecoinvt2 021 Google 2012 Google 2021 IPCC 2014 Microsoft ,2021



Capital goods	Based on spend value	N/A	N/A	Apple, 2016-2022 BEIS, 2022 Carbon Catalogue, 2016 Dell, 2018-2022 Samsung, 2020
Water consumption	Desalinated Water Consumption: 0.0027 tCO <sub>2</sub> e/M <sup>3</sup>	UAE specific emission factor - Jiahong Liu, Silan Chen, Hao Wang, Xiangdong Chen, <a href="#">"Calculation of carbon footprints for water diversion and desalination projects,"</a> The Seventh International Conference on Applied Energy – ICAE2015, <i>Energy Procedia</i> 75 (2015) 2483–2494, Elsevier	0.00015 tCO <sub>2</sub> e/M <sup>3</sup>	N/A

Solid waste	Solid Waste Discharges to Landfill: 0.000467tCO <sub>2</sub> e/kg	Department for Environment, Food and Rural Affairs (UK Government Department) - Adapted from within UK	Not applicable as landfilled waste was not considered in South Pole reports	
Employee commute	Car petrol: 0.000173 tCO <sub>2</sub> e/ Km  Car diesel: 0.00014 tCO <sub>2</sub> e/ Km  Rail: 0.08 tCO <sub>2</sub> e/ Km  Bus: 0.0036 tCO <sub>2</sub> e/ Km	N/A	Car petrol or diesel: 0.00022 tCO <sub>2</sub> e/ Km	BEIS, 2022
Air travel	Short haul economy class: 0.000246 tCO <sub>2</sub> e/ M3  Medium haul economy class: 0.000151 tCO <sub>2</sub> e/ M3  Medium haul business class: 0.000227 tCO <sub>2</sub> e/ M3  Long haul	N/A	Short: 0.000273pkm/ M3  Medium : 0.000167 pkm/m3  Long: 0.00018 pkm/m3	BEIS, 2022

	economy class: 0.00 0148 tCO <sub>2</sub> e/ M3			
	Long haul business class: 0.00 0429 tCO <sub>2</sub> e/ M3			
Freight	Air freight: 0.0 0054tCO <sub>2</sub> e /tonne km  Sea freight: 0.0 00003539 tCO <sub>2</sub> e/ tonne km HGV rigid small: 0.48674 tCO <sub>2</sub> e /tonne Km	N/A	Air: 0.00129 tCO <sub>2</sub> e/ tonne Km  Sea: 0.0 000161 954 tCO <sub>2</sub> e/ tonne Km  Road: 0.35631 tCO <sub>2</sub> e/ tonne Km	BEIS, 2022
Fuel energy production	Oil and gas extraction: 0.353  Utilities: 3.165	N/A	N/A	BEIS, 2022  Ecoinvent , 2022  IEA, 2022