“It is not enough to do your best; you must know what to do, and then do your best”
W. Edward Deming

2024

Axosomatic | Organizational Sustainable Intelligence

GHG Inventory Report
2022 – 2023

Calculated and Prepared by Axosomatic

For
Ajman University

www.axosomatic.com

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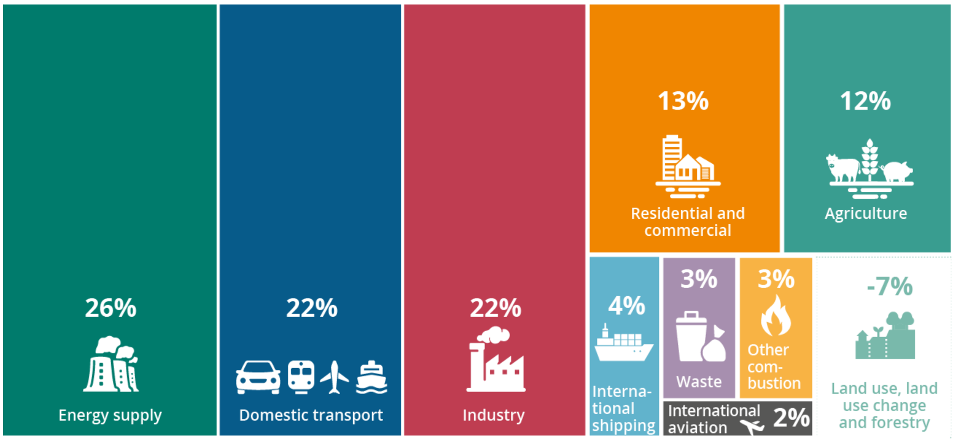

Sources of Greenhouse Gases (GHG) Emissions

Table of Contents

List of Tables

List of Figures

List of Acronyms and Abbreviations

BEIS	Department for Business, Energy, and Industrial Strategy
BSI	British Standards Institute
CDP	Carbon Disclosure Project
CO_2e	carbon dioxide equivalent
EPA	Environmental Protection Agency
EV	electric vehicles
GHG	greenhouse gases
GJ	gigajoule
GRI	Global Reporting Initiative
GWP	global warming potential
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
kg	kilogram
km	kilometer
LPG	liquefied petroleum gas
m^2	square meters
m^3	cubic meters
MW	megawatt
MWh	megawatt-hour
passenger.km	passenger-kilometer
SBT	science-based target
SBTi	Science-Based Target initiative
t	metric ton
tCO_2e	metric ton carbon dioxide equivalent
T&D	transmission and distribution
UAE	United Arab Emirates
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute

WTT Well-To-Tank

EXECUTIVE SUMMARY

Purpose and Scope

This Greenhouse Gases (GHG) inventory report is the outcome of the assessment phase of Axosomatic Net-Zero Carbon Intelligence solutions framework conducted at Ajman University (AU).

It presents the annual GHG emissions (scope 1, scope 2, and scope 3) for AU for the period from Sep 2022 – Aug 2023 (2022 – 2023). Throughout this report, the periods 2021 – 2022 and 2022 – 2023 indicate, respectively, the baseline and performance years.

In the previous report of 2021-2022, we considered the year 2020-2021 the baseline year as a pilot study to assess the GHG emissions at AU. However, that year was the lockdown year and most of AU operations were conducted online, and, thus, the GHG emissions did not represent the actual emissions. To have an accurate emission, it was decided to consider the year 2021 – 2022 as the baseline year.

The objectives of the report are:

1. Develop an accurate and rigorous approach to carbon accounting and reporting, based on the GHG Protocol Standards.
2. Include all GHG emissions from AU, including those upstream and from employee commuting.
3. Compare the GHG emissions of the performance year to those of the baseline year.
4. Provide AU with expert recommendations on how to reduce its GHG emissions.
5. Bring validity to AU performance in relation to GHG emissions.
6. Improve AU ranking.

The GHG Protocol represents the most rigorous approach to emissions accounting and has been adopted by many private and public sectors.

Calculation of GHG emissions is based on GHG protocol, BEIS, BSI, CEDA, CDP, EPA, GRI, GWP, IPCC, ISO, SBT, SBTi, WBCSD, WRI, and local energy data.

Summary of Emissions for the Performance Year[1]

The following table summarize the GHG emissions attributed to AU in the baseline and performance years[2]:

	2021 – 2022 (Baseline Year)		2022 – 2023 (Performance Year)		
Comparison of Overall GHG Emissions					
Description	GHG Emission (tCO_2e)	% of Total	GHG Emission (tCO_2e)	% of Total	**% Difference**
Scope 1: Direct GHG Emission	1,240.36	5.77%	966.64	4.55%	**-22.07%**
Scope 2: Indirect GHG Emission	12,576.45	58.55%	12,586.35	59.21%	**0.08%**
Scope 1 + Scope 2	13,816.81	64.33%	13,552.99	63.76%	**-1.91%**
Scope 3: Indirect GHG Emissions	7,661.86[3]	35.67%	7,703.31	36.24%	**0.54%**
Certified green electricity	0	0	0	0	0.00%
Purchased emission reductions	0	0	0	0	0.00%
Total GHG Emissions	**21,478.67**	100.00%	**21,256.31**	100.00%	**-1.04%**

[1] Details are described in sections 2 to 6 of this report.
[2] Please note that, due to the rounding of numbers, the figures may not add up exactly to the total provided.
[3] Includes approximate data of business travel.

Table 1. Summary of GHG Emissions in the baseline and performance years.

Impact of AU's Activities on the Environment

The following table compares the warming effect of AU's activities on the environment, in the performance year to the baseline year:

Impact of Warming Effect on the Environment			
Greenhouse Gases	Total Baseline Year	Total Performance Year	%Difference
Carbon dioxide (CO_2)	21,346.47	21,124.02	**-1.04%**
Methane (CH_4)	48.17	48.04	**-0.26%**
Nitrous oxide (N_2O)	83.39	82.90	**-0.59%**
Hydrofluorocarbons (HFCs)	1.36	1.36	0.00%
Perfluorocarbons (PFCs)	0	0	0
Sulphur hexafluoride (SF_6)	0	0	0
Total	21,479.38	21,256.33	-1.04%

Table 2. Impact of AU's Activities on the Environment.

Key Findings

During the year 2022 – 2023, AU has made considerable progress in managing, controlling, and reducing the emissions related to its activities. The following are the findings of scope 1, 2, and 3 emissions calculated for the performance year 2022 - 2023:

Data Collection

1. AU provided all data for the performance year, as per the GHG protocol and as applicable to its activities.
2. In the previous 2 years 2020-2021 and 2021-2022, the data for refrigerant leakage and business travel were not provided.
3. It has been decided to consider the year 2021-2022 as the baseline year, because the year 2020-2021 was the lockdown year and almost all activities were conducted online.
4. To allow for meaningful comparison between the performance year and the baseline year, and to avoid having inflated emissions, the following have been adopted:
    a. The refrigerant leakage of the baseline year was considered to be equal to that of the performance year. Please see section 4 (scope 1 emissions).
    b. Add approximate data of business travel to the baseline year. Please see section 6 (scope 3 emissions).
    c. The GHG report for the 2 years 2020-2021 and 2021-2022 will remain as is.
    d. The baseline data in this report will be used as the official reference for the subsequent years.

Emissions Summary

5. AU has reduced its Scope 1 GHG emissions in the performance year by 22%, compared to the baseline year. This was due to the reduction of the LPG consumption in the performance year.
6. AU managed to reduce the GHG emissions attributed to petrol and diesel consumptions in owned vehicles by 14%, compared to the Baseline year.
7. The sum of scope 1 and 2 emissions is lower by 1.91%, compared to the baseline year.
8. The total emission in the performance year is lower by 1.04% compared to the baseline year.

9. Scope 2 and 3 emissions in the performance year are higher by 0.08% and 0.54% respectively, than those in the baseline year.
10. AU Impact of the warming effect on the environment in the performance year compared to the baseline year:
    a. The effect of carbon dioxide has been reduced by 1.04%.
    b. The effect of Methane has been reduced by 0.26%.
    c. The effect of Nitrous dioxide has been reduced by 0.59%
    d. The total impact on the environment has been reduced by 1.04.

SBTi Reduction and Benchmarking Metrics

1. Though AU has made considerable and tangible efforts to reduce GHG emissions related to its activity, additional efforts need to be made to meet the SBTi international annual reduction target of 8.4%, on average, by 2035. Please refer to section 2.4 for additional details.

2. The AU (GHG/Weighted Campus Users[4]) in the performance year is higher than that in the baseline year, which indicates that additional effort is needed to reduce the total scope 1 and 2 emissions, by revising the strategic plan. Please refer to section 2.1 for additional details.

The Next Step

Following an in-depth benchmarking analysis and by drawing upon the industry-leading practices of renowned institutions, Axosomatic proposes a comprehensive emission reduction strategy, with target objectives, actionable steps, and key performance indicators (KPIs) to significantly reduce the carbon emissions of scope 1, 2, and 3. This strategy is part of our sustainability solution to AU, and we can work with the team to implement and monitor it to achieve the required reduction. Please refer to section 3.4 for a detailed description of our strategy.

Report Outline

The report is divided into 7 sections. Section 1 describes the institutional boundary, parameters, data assumption and methodology. Section 2 presents an overview of the GHG emissions for 2022-2023.

Section 3 describes the SBTi target reduction and Axosomatic strategy to assist AU achieve the Net-Zero target by 2050.

Sections 4 to 6 describe the GHG emissions of scope 1, 2, and 3 for the performance year and its comparison with the baseline year. Section 7 presents a summary and recommendations.

[4] This metric is developed by AACHE to assess the effectiveness of the institution's strategic plan in reducing its scope 1 and scope 2 emissions.

1. INTRODUCTION

This section describes an overview of Ajman University, the institutional boundary, the institutional parameters, data assumption and methodology.

1.1 Institutional Description[5]

Established in 1988 as the first private university in the GCC, Ajman University (AU) was also the first university in the UAE to admit expatriate students. AU continues to be a pioneer for inclusion, innovation, and social impact. In 2020, Ajman University became one of the first six higher education institutions in the world to receive global accreditation from the Quality Assurance Agency (QAA), UK's independent body and a global leader in quality assurance for higher education.

Ajman University is proactive in maintaining a green campus and raising sustainability awareness among its students, faculty, and staff, details of which is available at this link: Energy Conservation | CAMPUS (ajman.ac.ae).

To further support its mission, AU established a Sustainable Investment Policy to guide its investment and in line with United Nations Sustainable Development Goals (SDGs 11,12,13) and the Global 2050 CO_2 Net Zero. Details of the AU Sustainable Investment Policy is available at this link: Sustainable Investment Policy | CAMPUS (ajman.ac.ae). The Green House Inventory Report is a further to the AU mission to maintain an Organizational Sustainable Intelligence.

1. 2 Institutional Boundary

Descriptive information	Company response
Company name	Ajman University
Description of the company	Higher Education Institution
Chosen consolidation approach (equity share, operational control or financial control)	Operational Control
Description of the businesses and operations included in the company's organizational boundary	Providing undergraduate and graduate programs in Art, Humanities, Engineering, and Medical Sciences in one campus. Provides in-campus cafes and restaurant, transportation, and housing for students.
The reporting period covered	Sep 2022 – Aug 2023
A list of scope 3 activities included in the report	Upstream (Categories 1 to 7)
A list of scope 1, scope 2 and scope 3 activities excluded from the report with justification for their exclusion	All scope 1 and scope 2 are included. Upstream scope 3 activities are included, excluding Upstream leased assets. All Downstream are excluded. Reason for exclusion: activities are not applicable to Ajman University.
The year chosen as Baseline year and rationale for choosing the Baseline year	2021 - 2022[6]
Carbon reduction plan and target by at least 2050.	Ajman University is in the process of implementing a solution framework to optimize its operations and reduce GHG emissions by 50% by 2030.

Table 3. Institutional Boundary.

[5] Source: Ajman University website.
[6] The year 2021 – 2022 is chosen as the Baseline year because the year 2020 – 2021 was the lockdown year.

1.3 Institutional Parameters[7]

Organizational Metrics			
Item	**Descriptions**	**Baseline year (2021 – 2022)**	**2022 - 2023**
1	Number of campuses owned	1	1
2	Number of campuses rented	0	0
3	Number of buildings owned	13	13
5	Total FT Faculty	259	239
6	Total PT Faculty	74	65
7	Total FT Staff	525	527
8	Total PT Staff	15	16
	Total Employee	**873**	**847**
	Employee FTE[8]	**813**	**793**
9	Total FT Students	5,048	5,077
10	Total PT Students	1,467	1,274
	Total Students (TS)	**6,515**	**6,351**
	Student FTE[9]	**5,537**	**5,502**
11	Total Students in dormitories	1085	1239
12	Total campus area (m^2)	215,000	215,000
13	Total area occupied by buildings	125,680	125,680
14	Total green area (m^2)	8,600	8,600
15	Number of trees	4,237	4,237
16	Total grass area (m^2)	6,500	6,500

Table 4. Institutional parameters.

1.4 Data Assumption & Estimation

The following table provides information about the data submitted by AU for the 2022 – 2023 performance year, and methods used by Axosomatic to estimate the missing data:

Scope 1	**Provided Data**	**Comments/Recommendations**
Stationary Combustion	AU does not consume diesel and/oil for generation of electricity. AU provided consumption data of LPG, and Refrigerant R22 and 410A,	The provided LPG data is the purchased quantity and not the actual consumption. The provided data was used to calculate the emissions due to LPG. We suggest the LPG consumption be corrected to measure the consumed LPG per period and not the purchased volume. Similarly, the refrigerant data was the purchased quantity and not the leakage. Axosomatic assumed, with the agreement of AU engineer in-charge, that the leakage is 10% of the provided data. The same leakage was used for the baseline year. AU agreed to measure the top up as of March 2024.
Mobile Combustion	AU was able to provide data of the models and manufacturing years of their fleet of cars, buses, and other vehicles; and the petrol and diesel consumptions for each vehicle.	The provided data was very helpful to determine the GHG emissions with applying approximation.
Scope 2	**Provided Data**	**Comments/Recommendations**
Purchased Electricity	There are 13 buildings at the AU campus. AU provided the electricity and water consumptions for all buildings.	The provided data was used to calculate scope emissions.

7 Source: Ajman University.
8 Employee Full-time Equivalent based on CHEDS Formula.
9 Student Full-time Equivalent based on CHEDS formula.

Scope 3	Provided Data	Comments/Recommendations
Purchased goods and services	AU does not operate restaurants on its campus, but there are cafeterias operated by external business. Data about Food & Beverages, Printing Papers, Toilet Papers, Tissue Papers, Water, and Cloud Services were provided.	We suggest that AU improves its procurement procedures, the product and process Life Cycle Assessment to improve data acquisition and GHG emissions calculation accuracy. We also recommend that AU deals with suppliers that are GHG compliant.
Capital goods	IT Equipment, Office Furniture, Medical Equipment	Sufficient data was provided to estimate the GHG emissions related to the IT equipment and furniture. Axosomatic used approximate data for the medical equipment at AU. Equipment depreciation was applied.
Fuel- and energy- related activities	Transmission and Distribution (T&D) losses of purchased electricity, and WTT	T&D losses of purchased electricity was based on the consumption of electricity provided by AU and the current UAE emissions factor.
Upstream T&D	T&D of Purchased Good and Capital Good	Data for T&D of purchased goods was provided for the in-campus cafeterias only. AU was unable to provide similar data for all the goods purchased, such as LPG, papers, etc. It should be noted that this data is hard to get since most suppliers in the UAE are not GHG compliant. AU is in the process to restructure its procurement processes in line with the GHG standard.
Waste generated in operations	Wastewater, General Waste, Medical Waste, Food Waste, Paper Waste.	AU provided complete data for all types of waste.
Business travel	Travel and accommodation of employees/contractors.	Complete business travel data, by land and air, was provided. Approximate business travel data was used for the baseline year,
Employee commuting	Employee commuting from and to AU.	Axosomatic designed a survey questionnaire and submitted it to AU Office of Sustainability (AUOS), which was then sent by the AUOS to their employees and students. The response rates were 71.6% students, 9.5% faculty, and 18.9% staff. Axosomatic used statistical tools and a conservative approach to estimate the commuting data for the entire AU population.

Table 5. Data Assumption and Estimation.

1.5 Methodology

The GHG accounting and reporting procedure adhere to the foundations outlined in the 'The Greenhouse Gas Protocol: GHG Protocol: A Corporate Accounting and Reporting Standard – Revised Edition' (referenced hereafter as the 'GHG Protocol') and its supplementary guide, the 'Corporate Value Chain (Scope 3) Accounting and Reporting Standard'. These standards represent the preeminent global accounting frameworks, endorsed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), that are utilized by both governmental entities and corporate leaders as trusted tools to effectively comprehend, quantify, and manage greenhouse gas (GHG) emissions. The development of these standards was a collaborative effort between the aforementioned institutions, reflecting the collective wisdom and expertise in the field of GHG emissions measurement.

The accounting process was meticulously executed upon key principles encapsulated within the ‘GHG Protocol’, as outlined below:

1. Relevance: This involves the establishment of an inventory boundary that accurately represents the GHG emissions attributable to the company and caters to the informational needs of its user base, thereby facilitating informed decision-making.
2. Completeness: The execution of thorough and all-encompassing accounting that encapsulates every emission source that lies within the delineated inventory boundary. Any emissions not included are explicitly acknowledged and justified as to why they are not covered within the scope of the inventory.
3. Consistency: Ensuring that the GHG emissions information is comparable over distinct time periods and that any modifications to the collected data are methodically documented, maintaining a clear and consistent historical record.
4. Transparency: Upholding a standard of clarity and sufficiency in the data inventory that involves a coherent and systematic approach to handling and addressing pertinent issues.
5. Accuracy: Striving to minimize uncertainties and actively preventing the systematic overstatement or understatement of GHG emissions, thus achieving a high level of confidence in the reported figures.

1.6 Emission Factors

Axosomatic used a database of 20k global emissions factor and UAE location-based emissions factor used for scope 1 and scope 2.

2. OVERVIEW OF AU 2022 – 2023 EMISSIONS

The following figure and tables show, respectively, the breakdown of GHG emissions and summary of Scope 1, Scope 2 GHG emissions attributed to Ajman University during the periods 2021 – 2022 (the Baseline year) and 2022 – 2022 (the performance year), expressed in tCO_2e (Metric Ton of CO_2 equivalent). The column (%Total) indicates the percentage of scope 1 and scope 2 GHG emissions in relation to the Total GHG Emissions. The last column (%Increase) indicates the % increase of GHG emissions in the performance years with respect to the baseline year. Negative percentage indicates a decrease in the emission.

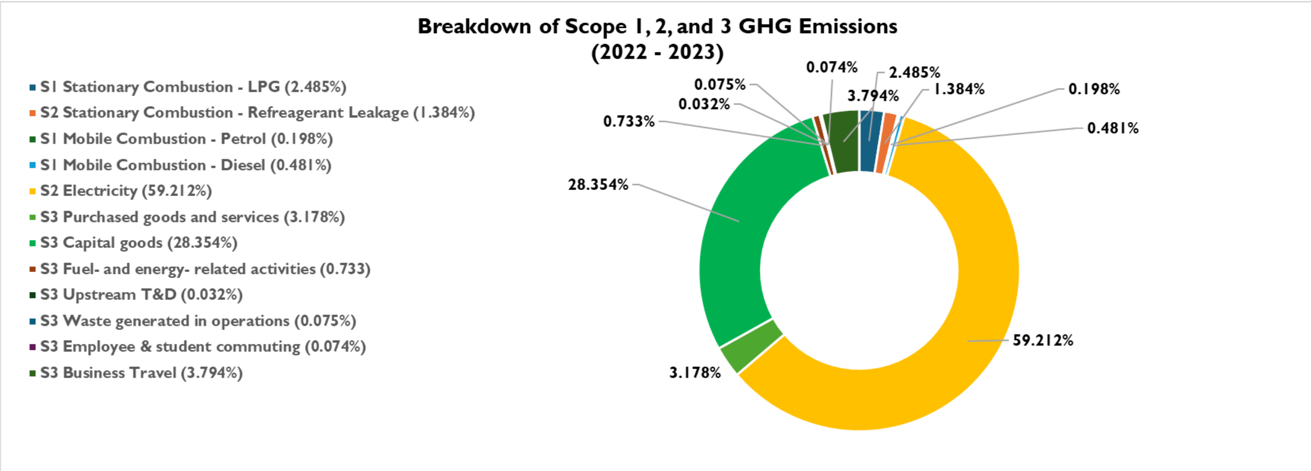

Figure 1. Breakdown of scope 1, 2, and 3 emissions.

	2021 – 2022 (Baseline Year)		2022 – 2023 (Performance Year)		
Comparison of Overall GHG Emissions					
Description	Emission tCO_2e)	% of Total	Emission (tCO_2e)	% of Total	**% Difference**
Scope 1: Direct GHG Emission	1,240.36	5.77%	966.64	4.55%	**-22.07%**
Scope 2: Indirect GHG Emission	12,576.45	58.55%	12586.35	59.21%	0.08%
Scope 1 + Scope 2	**13,816.81**	**64.33%**	**13,552.99**	**63.76%**	**-1.91%**
Scope 3: Indirect GHG Emissions	7,661.86	35.67%	7703.31	36.24%	0.54%
Certified green electricity	0	0	0	0	0
Purchased emission reductions	0	0%	0	0	0
Total GHG Emissions	21,478.67	100%	21,256.30	100.00%	**-1.04%**
Comparison of Scope 1 GHG Emissions by Source					
Source	Emission (tCO_2e)		Emission (tCO_2e)		**% Difference**
LPG	778.882		528.13		**-32%**
Refrigerant Leakage	294.25		294.25		0%
Petrol	52.274		42.11		**-19%**
Diesel	114.957		102.15		**-11%**
Comparison of Scope 2 GHG Emissions by Source					
Source	Emission (tCO_2e)		Emission (tCO_2e)		**% Difference**
Purchased Electricity	12,576.39		12,586.35		0.1%
Comparison of Scope 3 GHG Emissions by Source					
Source	Emission (tCO_2e)		GHG Emission (tCO_2e)		**% Difference**
Purchased goods and services	118.783		675.609		468.78%
Capital goods	6740.846		6026.99		**-10.59%**
Energy related activities	159.282		155.814		**-2.18%**
Upstream T&D	1.532		6.782		342.69%
Waste generated in operations	20.919		15.902		**-23.98%**
Business Travel	604.847		806.463		33.33%
Employee commuting	15.599		15.754		0.99%

Table 6. Summary of GHG emissions 2021 – 2022.

Scope 2 GHG Emissions by Source			
Sources (Buildings)	**2021 – 2022 (Baseline Year)**	**2022 – 2023 (Performance Year**	**% Difference**
SZC	1,303.14	1,323.65	1.57%
4088 J2	692.08	711.92	2.87%
4089 J2	811.35	790.88	**-2.52%**
4083 J2	1,718.77	1,465.18	**-14.75%**
J2+S.FIELD	1,336.08	1,316.17	**-1.49%**
J1+LABOR CAMP	778.70	788.57	1.27%
4085 J1	1,140.45	1,136.53	**-0.34%**
4086 J1	1,020.01	1,109.74	8.80%
S.COMPLEX	348.86	469.35	34.54%
4092 F.HOSTEL + 0508 F.HOSTEL	1,570.65	1,527.38	**-2.75%**
4091 F.HOSTEL	472.38	466.77	**-1.19%**
5614 S.HUB	1,383.92	1,480.21	6.96%
Total	**12,576.39**	**12,586.35**	**0.1%**
Average	**1,048.03**	**1,048.86**	**0.03%**

Table 7. Comparison of Scope 2 emissions.

Axosomatic Comments

1. **General Comments**
    a. The above 2 tables compare the GHG emissions at AU during the baseline and performance years.
    b. As mentioned in our report last year, AU did not provide the data for Refrigerant leakage at that time, and consequently the calculated Scope 1 emission for the baseline year was 946.113 tCO_2e.
    c. This year, we received the data for the Refrigerant consumption, but not the leakage.
    d. Axosomatic used a conservative approach and considered the leakage to be 10% of the total consumption. This was discussed and agreed with AU engineer in-charge.
    e. To allow AU to have a meaningful comparison, we considered the refrigerant leakage for the baseline and performance years to be identical. Please see section 4.1.

2. **Performance Year (2022 – 2023)**

    Scope 1 GHG Emissions

    a. AU has reduced its scope 1 GHG emissions in the performance year by 22%, compared to the baseline year. This was due to the reduction of the LPG, petrol, and diesel consumptions in the performance year.
    b. The emissions related to the LPG consumption in the performance year has been reduced by 32% compared to the baseline year.
    c. AU managed to reduce the GHG emissions attributed to petrol and diesel consumption in owned vehicles by 19% and 11%, respectively, compared to the baseline year.
    d. The Total GHG Emissions (Scope 1 and 2) in the performance year has been reduced by 1.91% with respect to the Baseline year.

    Scope 2 GHG Emissions

    a. The GHG emissions due to purchased electricity remain almost the same as in the baseline year, albeit with an increase of 0.1%.

b. The GHG emissions of 58% of the sources (buildings) in both years are above 1000 tCO_2e (highlighted in yellow color).
c. The GHG emissions of 50% of the sources in the performance year (highlighted in green color) are less than those in the Baseline year.

Scope 3 GHG Emissions

a. The emission related to capital goods, energy related activities, and waste generated in operations in the performance year, have been reduced by 10.59%, 2.28%, and 23.98%, respectively, compared to baseline year.
b. The emissions related to purchased goods an services, and Upstream T&D have been substantially increased, compared to baseline year. Please sections 6.4.1 and 6.4.3 for details.

2.1 Axosomatic Recommendations to GHG Emissions

After thorough analysis of the GHG emissions for the years 2020-2021, 2021-2022, and 2022-203 calculated by our team, and based on best practices, we recommend the following:

Objectives	Actions
1. Reduce energy consumption.	a. Conduct energy audits to identify where and how energy is used across the campus. b. Replace incandescent bulbs with LED or energy-efficient lighting systems. c. Install motion sensors and daylight sensors to reduce lighting in unoccupied spaces and areas with sufficient natural light. d. Use energy-efficient air conditioning (HVAC) systems. e. Conduct regular maintenance of HVAC systems to ensure they operate efficiently. f. Implement smart thermostats to optimize cooling schedules based on occupancy and weather conditions. g. Encourage students and employees to adopt energy-saving habits, such as turning off lights and electronics when not in use. h. Increase awareness campaigns and workshops to educate the campus community about energy conservation. i. Use smart meters and energy management systems to monitor and control energy use across the campus.
2. Install Solar Panels	a. This option requires huge investment and careful planning. b. A 5KW panel cost approximately AED 35,000 and the return on investment could around 6 to 8 years.
3. Reduce stationary consumption.	a. Reduce the consumption of LPG or replace it with eco-friendly solutions. b. Measure and reduce the refrigerant leakage.
4. Reduce consumption of petrol and diesel.	a. Axosomatic suggests that AU investigates the reason for reduction in petrol and diesel consumptions and to continue in this direction. b. Replace some or all of AU vehicles with hybrid and/or EVs. c. This would reduce the scope 1 emissions from mobile sources by approximately 25%. d. Optimize the travel distance of student transport provided by AU.
5. Reduce emissions associated to Upstream activities (scope 3)	a. Partner with suppliers that are GHG compliant. b. Optimize transportation routes to reduce fuel consumption and emissions.

Objectives	Actions
	c. Implement waste reduction and recycling programs to minimize waste generation. d. Promote virtual meetings and telecommuting to reduce the need for travel. e. Offset unavoidable travel emissions through carbon offset programs or investments in renewable energy projects. f. Promote carpooling and ridesharing among employees to reduce single-occupancy vehicle trips.

Table 8. Axosomatic Recommendations.

Axosomatic has the expertise to work with AU to achieve the above objectives with the action plans. Please refer to section 3.4 for the detailed reduction strategy.

2.2 GHG Emissions Benchmarking Metrics

GHG emissions benchmarking for universities is based on established metrics, listed in table 8 below:

Description	Year 2021 - 2022	Year 2022 - 2023
Scope 1: Direct GHG Emission[10] (tCO_2e)	1240.363	966.64
Scope 2: Indirect GHG Emission[1] (tCO_2e)	12576.45	12,586.35
Scope 3: Indirect GHG Emissions (tCO_2e)	7,661.86	7,703.31
Total (tCO_2e)	21,478.67	21,256.30
FTEF[2]	813	793
FTSE[2]	5,537	5.502
GHG/FTEE and FTSE[11]	3.382	3.377
Weighted Campus Users	7,231.75	5,030.75
GHG/Weighted Campus Users[12] (tCO_2e)	1.91	2.69
GHG/Campus Area	0.100	0.099

Table 9. GHG Emissions and Metrics.

The Weighted Campus Users (WCU) metric is developed by the Association for the Advancement of Sustainability in Higher Education. It is used to measure how intensively a certain institution's population, those who live in campus, use the campus resources.

For example, an institution where a high percentage of students live on campus would witness higher GHG emissions, electricity and water consumptions, wastewater, and waste generation figures than otherwise comparable non-residential institutions.

The metric (GHG/Weighted Campus Users) is a function of Scope 1 and 2 emissions, total full-time employee equivalent, total full-time student equivalent, and total number of students resides at the in-campus housing owned by the institution.

The reduction of (GHG/Weighted Campus Users) in a performance year with respect to a baseline year, indicates the effectiveness of the institution's plan in reducing its Scope 1 and 2 emissions.

From the above table, the value of (GHG/Weighted Campus Users) in the performance year is higher than that in the baseline year. It indicates that AU managed to reduce the emissions (scope 1+ scope 2) in the performance year by 1.91%, in comparison with the baseline year. This is a milestone, but additional effort is needed to reduce the Total Scope 1 and 2 emissions.

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[10] Source: Axosomatic (www.axosomatic.com)
[11] FTEE (Full-Time Employe Equivalent) and FTSE (Full-Time Student Equivalent), based on CHEDS formula.
[12] Scope 1 and Scope 2 only.

2.2 GHG Emissions Reduction Schemes

Ajman University has developed an ambitious plan to reduce the GHG emissions attributed to its activities, by 2030 and 2050.

Axosomatic recommends adding the following reduction schemes adopted by most organizations, whenever applicable:

GHG Emissions Reduction Schemes		
Mobile and stationary combustion of biomass	Mass	tCO_2e
No Activity	n/a	n/a
Deforestation of two hectares or more	Mass	tCO_2e
No Activity	n/a	n/a
GHG stock liability	Mass	tCO_2e
No Activity	n/a	n/a
Renewable electricity generation & use	kWh generated	tCO_2e avoided
No Activity	n/a	n/a
Types of emission reductions purchased	Amount	tCO_2e
Certified green electricity (tCO2-e)	n/a	n/a
Purchased emission reductions (tCO2-e)	n/a	n/a
Total	n/a	n/a

Table 10. GHG Emissions Reduction Schemes.

2.3 GHG Emissions Benchmarking[13]

The following table compares GHG Emissions (Scope and Scope 2) and other metrics for the performance year, of Ajman University to selected international universities. The metrics (GHG/WCU and % Decrease) are used to indicate the effectiveness of the institution's plan to reduce its GHG emissions, during its path to Net-Zero Carbon. The (% Decrease) indicates the percentage reduction of total GHG emissions (Scope 1 and Scope 2) per weighted campus users for the performance year, with respect to the Baseline years. The higher the (positive value of % Decrease), the more effective the plan. The negative %Decrease indicates an increase or insufficient decrease in the emissions (scope 1 + scope 2), with respect to the baseline year.

								Performance Year		Baseline Year	
	Scope 1	Scope 2	TFES[14]	TFE[15]	WCU[16]	GHG/WCU[17]	% Reduction[18]	Start	End	Start	End
Loyola U Chicago	9,275.00	3,234.00	15,818.00	2,835.00	13,573.25	0.92	79.0%	01-Jul-21	30-Jun-22	01-Jul-07	30-Jun-08
Florida State U	17,627.00	90,606.00	39,829.00	7,079.00	35,538.75	3.05	23.4%	01-Jul-22	30-Jun-22	01-Jul-17	30-Jun-18
University of NC	19,457.00	37,673.00	27,599.00	3,658.00	23,973.00	2.38	38.6%	01-Jul-21	30-Jun-22	01-Jul-02	30-Jun-03
U Tennessee, Knoxville	80,464.00	82,493.00	28,329.00	7,089.00	26,565.75	6.13	24.0%	01-Jul-20	30-Jun-21	01-Jul-14	30-Jun-15
Ajman University, UAE	**966.64**	**12,586.35**	**5,501.00**	**793**	**5,030.75**	**2.69**	**-41.0%[18]**	**01-Sep-22**	**31-Aug-23**	**01-Sep-21**	**31-Aug-22**

Table 11. Benchmarking of AU Performance Year emissions with international HEIs.

[18]Note

The negative percentage indicates that AU managed to reduce its (scope 1+ scope 2) emissions by 1.9%, with respect to the baseline year. This indicates that the AU reduction strategy needs to be improved. A value of 0.79, with other parameters constant, would be reached if AU scope 1 + scope 2 is reduced by 68% with respect to the baseline 13817 tCO2e.

[13] Data compiled by Axosomatic (www.axosomatic.com). There are no official data published by other institutions in the UAE.
[14] Total Full Time Equivalent Students.
[15] Total Full-time Equivalent Employees.
[16] Weighted Campus Users.
[17] GHG Emissions per Weighted Campus Users.
[18] All values above 30%, indicate reductions in the GHG emissions with respect to the Baseline year. This is because the AU Baseline year is the lockdown year, which will challenge the plan to reduce the total Scope 1 and Scope 2 GHG emissions. However, it should be noted that it took the listed US universities an average of 10 years to bring down the GHG emissions by an average of 42%.

2.4 Emissions by Scope and Greenhouse Gases

The following tables provide the approximate emissions of greenhouse gases associated with Scope 1, 2, and 3 activities at AU, during the periods 2021 – 2022 and 2022 – 2023. It should be noted that, because of the rounding of digits, the figures may not add up exactly to the total tCO_2e in table 6.

It should also be noted from the tables, the emissions associated to Scope 2 are higher because of the consumption of purchased electricity. However, the greenhouse gas emissions, due to scope 1 sources, in the performance year have been reduced in comparison with the baseline year, as can be seen in the tables below.

As mentioned in section in Annex I, these gases have a stronger warming effect on the environment, compared to CO_2. Their effects can be reduced by using renewable energy, increasing environmental awareness among employees and students, and replacing existing vehicles with EVs and/or hybrid cars.

2021 – 2022 (Baseline Year)			
	Scope 1 (stationary and mobile consumption)	Scope 2	Scope 3
Carbon dioxide (CO2)	1237.36	12,448.62	7,660.49
Methane (CH4)	0.78	47.387	0.00
Nitrous oxide (N2O)	2.22	81.151	0.02
Hydrofluorocarbons (HFCs)	0	0	1.36
Perfluorocarbons (PFCs)	0	0	0.00
Sulphur hexafluoride (SF6)	0	0	0.00
Total (tCO_2e)	**1,240.36**	**12,577.16**	**7,661.86**

Table 12. Emissions by scope and greenhouse gases (2021 – 2022).

2022 – 2023 (Performance Year)			
	Scope 1 (stationary and mobile consumption)	Scope 2	Scope 3
Carbon dioxide (CO2)	964.35	12,457.72	7,701.95
Methane (CH4)	0.62	47.42	0
Nitrous oxide (N2O)	1.67	81.21	0.02
Hydrofluorocarbons (HFCs)	0	0	1.36
Perfluorocarbons (PFCs)	0	0	0
Sulphur hexafluoride (SF6)	0	0	0
Total (tCO_2e)	**966.64**	**12,586.35**	**7,703.34**

Table 13. Emissions by scope and greenhouse gases (2022 – 2023)

3. REDUCTION PLAN AND TARGETS

A carbon reduction target covering Scope 1 and 2 emissions by at least 2050 refers to Ajman University's commitment to reduce greenhouse gas (GHG) emissions that are directly produced by its own activities (Scope 1 emissions) and the emissions associated with the energy it consumes (Scope 2 emissions) by the year 2050.

3.1 AU Reduction Plan

Ajman University is committed to setting ambitious carbon reduction targets covering Scope 1 and 2 emissions in alignment with the urgency to combat climate change. These targets vary in terms of their specific emission reduction goals, timelines, and strategies, but they all share a common aim of transitioning to a low-carbon economy and reducing dependence on fossil fuels.

The targets set are as follows:

1. Net Zero Emissions by 2050: where Ajman University aims to balance its emissions with equivalent carbon removal or offsetting activities.
2. Percentage Reduction Targets: to reduce emissions by 50% by 2030 and 100% by 2050 compared to the baseline year of 2021-2022.
3. Renewable Energy Transition: Ajman University plans to transition to 100% renewable energy sources for electricity consumption (Scope 2) by 2040.
4. Energy Efficiency Improvement: to improve energy efficiency of buildings by aiming for a 25% reduction in energy consumption over the next 2 years.
5. Fleet Electrification Targets: to transition to electric vehicles (EVs) or other low-carbon alternatives, by aiming for a 50% of fleet to be electric by 2030.

3.2 Science Base Target Initiative

Axosomatic proposes an effective and structured reduction plan for AU, based on the Science Based Target Initiative (SBTi). This is a universal approach followed by many organizations.

The reduction targets for Scope 1, and 2 are shown in the table and chart in the next page. The baseline year is 2021 – 2022, and the Interim Target year is 2030.

It is noted that the average annual reduction till 2030 is 6.6%, and 11.3% from 2030 to 2035, for scope 1, 2.

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Scope 1 (tCO_2e)	1240.36	1175.24	1110.12	1045.00	979.88	914.77	849.65	784.53	719.41	654.29	589.17	524.05	458.93	393.81
Scope 2 (tCO_2e)	12576.45	11916.19	11255.92	10595.66	9935.40	9275.13	8614.87	7954.60	7294.34	6634.08	5973.81	5313.55	4653.29	3993.02
Scope 3 (tCO_2e)	7661.86	7259.61	6857.37	6455.12	6052.87	5650.62	5248.37	4846.13	4443.88	4041.63	3639.38	3237.14	2834.89	2432.64
Annual Reduction		5.30%	5.50%	5.90%	6.20%	6.60%	7.10%	7.70%	8.30%	9.10%	10.00%	11.10%	12.40%	14.20%

Table 14. Proposed reductions based on GHG emissions.

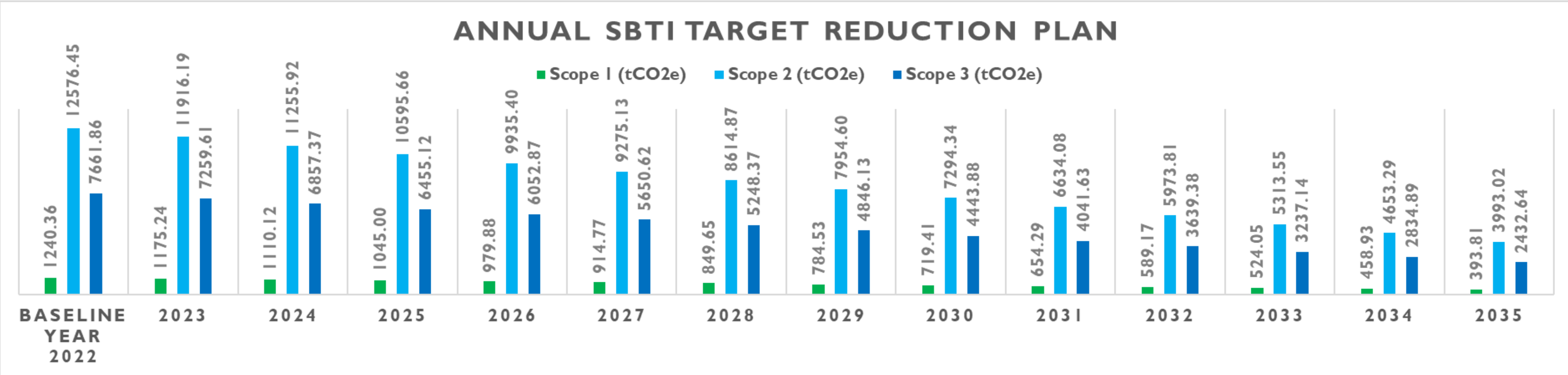

Figure 2. Proposed SBTi target reduction plan for AU.

3.3 The 5-Year SBTi Target

The following figure shows the expected emissions AU should achieve in the next 5 years, based in the SBTi standard to align AU efforts to achieve Net-Zero by 20250.

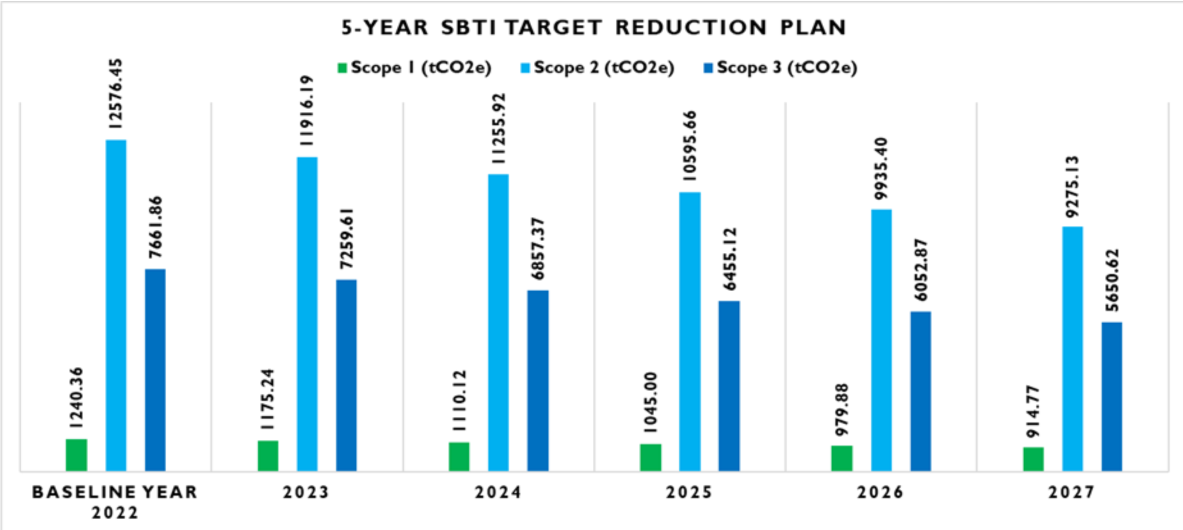

Figure 3. 5-Year SBTi Target Reduction Plan.

3.4 Axosomatic Reduction Strategy

Following an in-depth benchmarking analysis and by drawing upon the industry-leading practices of renowned institutions, Axosomatic proposes a comprehensive emission reduction strategy, with target objectives, actionable steps, and key performance indicators (KPIs) to significantly reduce the carbon emissions of scope 1, 2, and 3, attributed to AU activities, in the coming 5 years to achieve the Net-Zero target by 2050.

This strategy underpinned by a robust dataset, encompassing AU's emissions over the past three years, and is strengthened through the integration of our advanced, artificial intelligence-driven Net-Zero Carbon Intelligence framework, positioning this plan at the forefront of emissions reduction efforts.

This strategy is part of our sustainability solution to AU, and we can work with the team to implement and monitor it to achieve the required reduction. The strategy is detailed below:

Axosomatic Strategy

3.4.1 Achieve Reduction in Scope 1 Emissions

Goal 1: Enhance Energy Efficiency and Reduce LPG Usage

1. **Objective**
   a. Implement measures to optimize LPG usage and reduce emissions intensity.
2. **Actions**
   a. Conduct a comprehensive assessment of current LPG related emissions sources and identify areas for improvement.
   b. Upgrade equipment to minimize LPG usage and enhance energy efficiency.
3. **KPIs**
   a. Percentage reduction in LPG emissions compared to baseline year.
   b. Reduction in LPG consumption per unit of production or activity.

Goal 2: Minimize Refrigerant Leakage and Emissions

1. **Objectives**
    a. Implement leak detection and prevention measures to minimize refrigerant leakage.
    b. Capture and mitigate refrigerant emissions to reduce environmental impact.
2. **Actions**
    a. Conduct regular inspections and maintenance of cooling systems to detect and repair leaks promptly.
    b. Upgrade to low-leakage or leak-proof refrigeration equipment where feasible.
    c. Train staff on proper handling and maintenance procedures to minimize accidental releases.
    d. Implement refrigerant management best practices, including proper storage and disposal.
    e. Monitor refrigerant usage and emissions through continuous monitoring systems.
3. **KPIs**
    a. Percentage reduction in Refrigerant Leakage emissions compared to baseline year
    b. Number of refrigerant leaks detected and repaired within a specified timeframe.
    c. Reduction in refrigerant emissions intensity per unit of production or activity.
    d. Compliance with regulatory requirements and industry standards for refrigerant management.
    e. Adoption rate of low-leakage or leak-proof refrigeration equipment.
    f. Environmental impact assessment of refrigerant management practices.

Goal 3: Transition to Sustainable Transportation

1. **Objectives**
    a. Reduce GHG emissions from petrol and diesel consumption in the vehicle fleet.
    b. Objective: Transition to alternative fuels or electric vehicles to lower emissions intensity.
2. **Actions**
    a. Assess the feasibility of transitioning to alternative fuels such as compressed natural gas (CNG) or biofuels.
    b. Invest in electric vehicle infrastructure, including charging stations and fleet electrification.
    c. Optimize vehicle routes and schedules to minimize fuel consumption and emissions.
    d. Implement eco-driving training programs to promote fuel-efficient driving behaviors among AU drivers.
3. **KPIs**
    a. Percentage reduction in transportation emissions compared to baseline year.
    b. Percentage reduction in petrol and diesel consumption compared to baseline year.
    c. Adoption rate of alternative fuels or electric vehicles in the fleet.
    d. Percentage reduction in emissions intensity per vehicle or per kilometer traveled.
    e. Fuel efficiency improvements achieved through eco-driving initiatives.
    f. Cost savings realized through fuel consumption reductions and fleet electrification.
    g. Number of electric or hybrid vehicles in the fleet.

3.4.2 Achieve Reduction in Scope 2 Emissions

Goal 1: Minimize Scope 2 Emissions Through Renewable Energy Adoption

1. **Objectives**
    a. Source electricity from renewable sources to reduce Scope 2 emissions.
    b. Increase energy efficiency to further mitigate Scope 2 emissions.
2. **Actions**
    a. Purchase renewable energy certificates (RECs) or enter into power purchase agreements (PPAs) with renewable energy providers.
    b. Install on-site renewable energy systems such as solar panels.

c. Implement energy management systems to optimize electricity use and reduce waste.
d. Upgrade energy-efficient appliances, lighting, and HVAC systems to lower electricity consumption.
e. Conduct employee awareness campaigns and training programs to promote energy conservation practices.

3. **KPIs**
   a. Percentage reduction in Scope 2 emissions compared to baseline year.
   b. Percentage of electricity sourced from renewable sources.
   c. Renewable energy capacity installed on-site.
   d. Energy intensity improvements in facilities and operations.
   e. Total energy consumption reduction achieved through efficiency measures.
   f. Employee engagement levels in energy conservation initiatives.
   g. Cost savings achieved through renewable energy adoption and efficiency improvements.

3.4.3 Achieve Reduction in Scope 3 Emissions

Goal 1: Minimize GHG emissions associated with purchased goods and services

1. **Objectives**
   a. Identify emissions-intensive suppliers and materials.
   b. Implement sustainable procurement practices to reduce emissions across the supply chain.

2. **Actions**
   a. Conduct supplier assessments to evaluate environmental performance and emissions footprint.
   b. Establish criteria for selecting suppliers based on sustainability metrics, including GHG emissions.
   c. Encourage suppliers to adopt emissions reduction targets and sustainable production practices.
   d. Collaborate with suppliers to optimize transportation and logistics to reduce emissions from goods delivery.

3. **KPIs**
   a. Percentage reduction in category 1 emissions compared to baseline year.
   b. Percentage of emissions-intensive suppliers evaluated and engaged.
   c. Reduction in GHG emissions per unit of purchased goods and services.
   d. Adoption rate of sustainable procurement practices among suppliers.
   e. Cost savings achieved through emissions reduction initiatives in the supply chain.

Goal 2: Reduce GHG emissions associated with capital goods procurement and utilization.

1. **Objectives**
   a. Identify opportunities to invest in low-carbon technologies and equipment.
   b. Improve energy efficiency and resource conservation in capital-intensive processes.

2. **Actions**
   a. Assess the lifecycle emissions of capital goods and equipment, including manufacturing, use, and disposal phases.
   b. Invest in energy-efficient machinery and technologies to reduce energy consumption and emissions.
   c. Implement asset management strategies to prolong the lifespan of capital goods and minimize waste.
   d. Explore opportunities for equipment sharing or leasing to optimize resource utilization.

3. **KPIs**

a. Reduction in GHG emissions per unit of capital goods procured.
b. Energy efficiency improvements achieved through technology upgrades.
c. Extension of equipment lifespan and reduction in waste generation.
d. Cost savings realized through efficient asset management practices.

Goal 3: Transition to renewable energy sources and improve energy efficiency in operations

1. **Objectives**
   a. Reduce GHG emissions from energy consumption across facilities and operations.
   b. Objective: Increase renewable energy sourcing and investment in clean energy projects.

2. **Actions**
   a. Conduct energy audits to identify opportunities for energy efficiency improvements.
   b. Retrofit facilities with energy-efficient lighting, HVAC systems, and insulation.
   c. Invest in on-site renewable energy systems such as solar panels or wind turbines.
   d. Purchase renewable energy certificates (RECs) or enter into power purchase agreements (PPAs) with renewable energy providers.

3. **KPIs**
   a. Percentage reduction in GHG emissions from energy consumption compared to baseline year.
   b. Renewable energy share in total energy consumption.
   c. Energy intensity improvements achieved through efficiency measures.
   d. Cost savings realized through renewable energy adoption and efficiency improvements.

Goal 4: Reduce GHG emissions associated with Upstream Transportation and Distribution

1. **Objective**
   a. Collaborate with logistics partners to implement sustainable transportation practices.

2. **Actions**
   a. Partner with suppliers that comply with GHG standards.

3. **KPIs**
   a. Percentage reduction in GHG emissions from upstream transportation and distribution activities.
   b. Cost savings achieved through transportation optimization initiatives.

Goal 5: Minimize GHG emissions from waste generation and disposal

1. **Objectives**
   a. Reduce waste generation through source reduction and recycling.
   b. Implement waste-to-energy and landfill gas capture projects to mitigate emissions.

2. **Actions**
   a. Implement waste reduction and recycling programs to minimize waste sent to landfill.
   b. Invest in waste-to-energy technologies such as anaerobic digestion or incineration with energy recovery.
   c. Capture and utilize methane emissions from landfills for energy generation.
   d. Educate employees on proper waste segregation and recycling practices to maximize diversion rates.

3. **KPIs**
   a. Reduction in GHG emissions from waste management activities.
   b. Increase in waste diversion and recycling rates.
   c. Energy generated from waste-to-energy projects.

d. Cost savings realized through waste reduction and energy recovery initiatives.

Goal 6: Reduce GHG emissions associated with employee business travel

1. Objectives
    a. Encourage remote collaboration and virtual meetings to minimize travel.
    b. Optimize travel logistics and transportation modes to reduce emissions.
2. **Actions**
    a. Utilize video conferencing and virtual collaboration tools as alternatives to in-person meetings.
    b. Implement a travel management program to optimize flight routes, accommodation, and ground transportation.
    c. Provide incentives for employees to choose lower-emission transportation options such as public transit or carpooling.
3. **KPIs**
    a. Percentage reduction in GHG emissions from employee business travel.
    b. Increase in remote collaboration and virtual meeting participation.
    c. Adoption rate of sustainable travel policies and practices.
    d. Cost savings achieved through travel optimization initiatives.

Goal 7: Minimize GHG emissions from employee commuting to and from the workplace

1. **Objectives**
    a. Promote sustainable commuting options such as public transit, cycling, or carpooling.
    b. Provide incentives for remote work and flexible commuting arrangements.
2. **Actions**
    a. Offer subsidies or incentives for employees who use sustainable transportation modes such as public transit or cycling.
    b. Implement a carpooling program to encourage ride-sharing among employees.
    c. Provide designated parking and amenities for cyclists and promote active transportation.
    d. Facilitate remote work and flexible scheduling to reduce the need for daily commuting.
3. **KPIs**
    a. Percentage reduction in GHG emissions from employee commuting.
    b. Increase in the adoption of sustainable commuting options among employees.
    c. Participation rate in carpooling and active transportation programs.
    d. Reduction in vehicle miles traveled (VMT) per employee.

4. SCOPE 1: DIRECT GHG EMISSIONS

Scope 1 direct GHG emissions attributed to Ajman University, occurred from stationary combustion of LPG and Refrigerant Leakage, and mobile combustion of petrol and diesel operated cars, buses, pickups, trucks, and mobile dental clinic owned by AU.

4.1 Scope 1 Data Provided by AU

Table 14 below lists the consumption data provided by AU for LPG, Refrigerant Leakage, petrol, and diesel. AU does not use stationary energy sources such as diesel and heating oil.

Summary of Scope 1 Data Provided by AU			
Source	**Year 2021 - 2022**	**Year 2022 - 2023**	**% Difference**
Consumption of Stationary Combustion			
Diesel	Not Applicable	Not Applicable	------
Heating Oil	Not Applicable	Not Applicable	------
Propane/LPG (m^3)	504	342	-47%
Refrigerant Leakage[19] (Kg)	167	167	0%
Consumption of Mobile Combustion[20]			
Petrol (liters)	22,339.20	17,920.99	-25%
Diesel (litters)	41,203.20	38,400.96	-7%

Table 15. Summary of Scope 1 Data provided by AU.

4.2 Scope 1 GHG Emissions

Table 15 below lists the GHG emissions attributed to the stationary and mobile sources listed in the above table:

Summary of Scope 1: Direct GHG Emissions (tCO_2e)			
Source	**Year 2021 - 2022**	**Year 2022 - 2023**	**% Difference**
GHG Emissions due to Stationary Combustion[21]			
Diesel	Not Applicable	Not Applicable	------
Heating Oil	Not Applicable	Not Applicable	------
Propane/LPG	778.88	528.13	-32%
Refrigerant Leakage[22]	294.25	294.25	0.0%
Sub-Total	1,073.13	822.38	-23%
GHG Emissions due to Mobile Combustion[23]			
Petrol	52.274	42.11	-19%
Diesel	114.957	102.15	-11%
Sub-Total	**167.231**	144.26	-14%
Total Scope 1 Emissions	**1,240.36**	**966.64**	-22%

Table 16. Scope 1 GHG Emission from stationery and mobile combustions.

[19] Refrigerant leakage from air-conditioning system (R22+R410A).
[20] Ajman University owns cars, buses, pickup and truck vehicles, some petrol operated, and some diesel operated.
[21] GHG emissions from the consumption of LPG, and leakage of refrigerant in the air-conditioning system.
[22] Refrigerant leakage was not recorded by Ajman University during the reporting periods.
[23] GHG emissions from transportation vehicles owned by AU.

4.3 Scop 1 GHG Emissions by Mobile Combustion Source (2022 – 2023)

Source (Petrol)	Units	tCO2e
Cars	6	11.15
Buses	9	27.86
Pickup	2	3.11
Total GHG Emission		**42.11**

Table 17. Scope 1 GHG emissions from mobile petrol combustion (2022 – 2023).

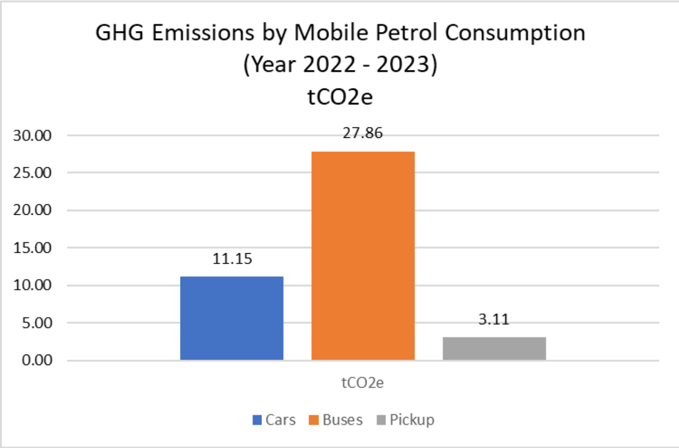

Figure 4. GHG emissions from mobile petrol combustion (2022 – 2023)

Source (Diesel)	Units	tCO2e
Truck	1	2.29
Buses	25	96.55
Pickup	2	2.25
Dental Clinic	1	1.06
Total GHG Emission		**102.15**

Table 18. Scope 1 GHG emissions from mobile diesel combustion (2022 – 2023).

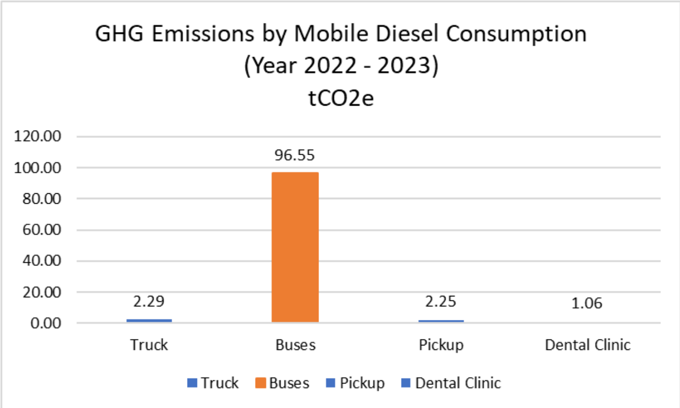

Figure 5. GHG emissions from mobile diesel combustion (2022 – 2023).

Source (Petrol and Diesel)	tCO2e
Cars	11.146
Pickup	5.352
Busses	124.413
Dental Clinic	1.064
Truck	2.285
Total GHG Emission	**144.261**

Table 19. Scope 1 GHG emissions from mobile petrol and diesel combustion (2022 – 2023).

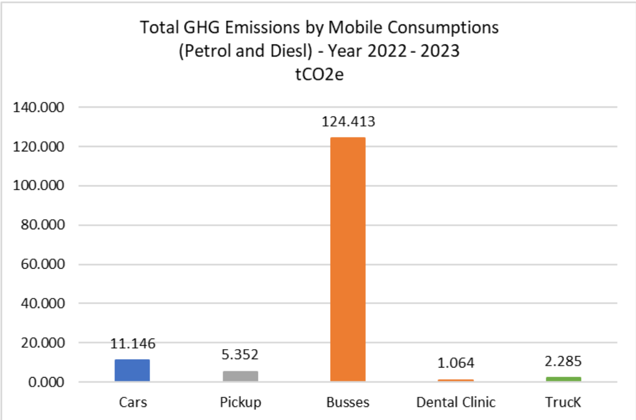

Figure 6. GHG emissions from mobile petrol and diesel combustion (2022 – 2023).

4.4 Summary Discussion of Scop 1 Direct GHG Emissions

The following table and chart present the summary of Scope 1 Direct GHG Emissions by the sources at Ajman University. The following are observed from the table:

1. The GHG emissions from all sources, stationary and mobile, during the year 2022 – 2023 are lower than those during 2021 – 2022, by 22%.
2. GHG emissions from LP is lower in 2022-2023 due to the lower consumption of LPG.
3. Similarly, the emission from mobile combustions is lower in 2022-2023 due to lower consumption of petrol and diesel. These emissions could be further reduced by replacing the existing vehicles with EVs and/or hybrid cars. Research by the European Energy Agency found that the carbon emission of an electric car is around 17 – 30% lower than driving a petrol or diesel car . This means that the GHG emissions of 144.26 tCO2e (table 15), would be reduced by 34 tCO2e.
4. The emissions from the mobile combustion of diesel, in both years, are higher than the emissions from the combustion of petrol. This may be attributed to the number of buses used for transportation.
5. The emission from the consumption of LPG and refrigerant leakage is the highest, compared to the mobile of combustion of petrol and diesel.

Table 20. Summary of Scope 1: Direct GHG emissions by source - Year 1 and Year 2.

Source	2021 - 2022	2022 - 2023	% Increase
LPG	778.88	528.13	-32%
Refrigerant Leakage	294.25	294.25	0%
Petrol	52.274	42.11	-19%
Diesel	114.957	102.15	-11%
Total	**1,240.36**	**966.64**	**-22%**

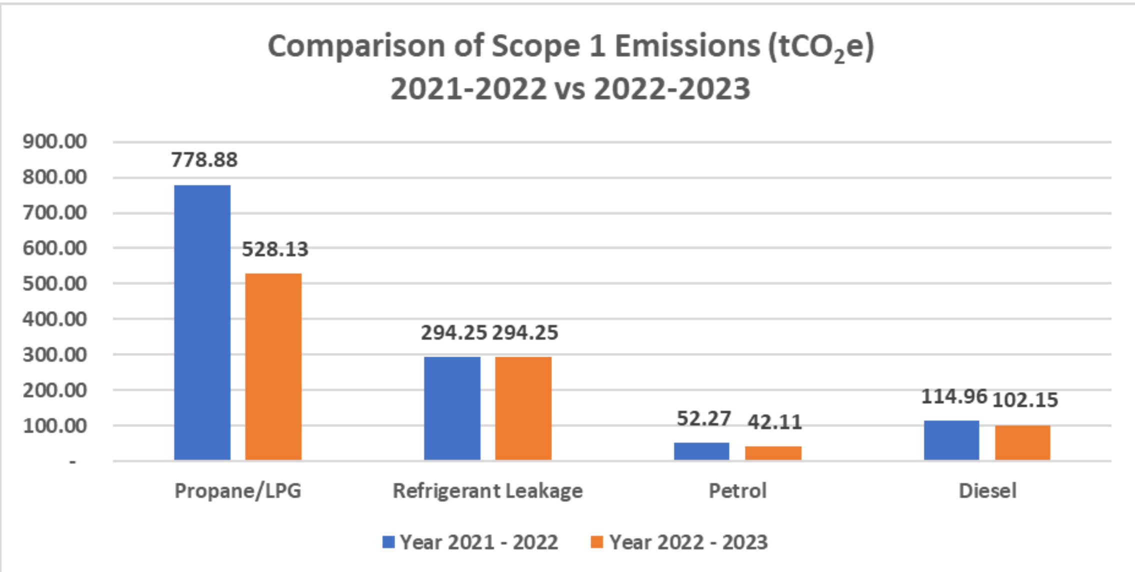

Figure 7. Scope 1 GHG emissions by source in 2021-2022 and 2022-2023.

5. SCOPE 2: INDIRECT GHG EMISSIONS

Scope 2 indirect GHG emissions attributed to Ajman University, from the consumptions of purchased electricity.

5.1 Electricity & Water Consumption

There are 13 buildings at AU, the electricity and water consumptions were provided for all buildings consumptions, as demonstrated in table 20 below. The GHG emissions associated with water consumption will be included in Scope 3.

Source	2021 - 2022	2022 - 2023
	Data Provided	
Electricity	13 buildings	13 buildings
Water	13 buildings	13 buildings

Table 21. Electricity and water consumptions data provided by AU.

5.2 Summary of Scope 2 GHG Emissions

The following table compares the electricity consumption and GHG emissions, expressed in metric ton of CO_2 equivalent, at AU during the periods of 2021 – 2022 and 2022 – 2023.

Source	2021 – 2022 (Baseline Year)		2022 - 2023		
	Consumption	tCO_2e	Consumption	tCO_2e	% Difference
Electricity (MWH)	21,754.69	12,576.39	21,771.93	12,586.35	0.08%
Average	1,812.89	1,814.33	967.41	968.18	0.03%

Table 22. Scope 2 GHG Emissions in 202-2022 and 2022–2023.

Source (Building)	MW Consumption			Scope 2 Emissions (tCO_2e)		
	2021 - 2022	2022 - 2023	%Increase	2021 - 2022	2022 - 2023	%Increase
1. SZC	2,254.18	2,289.66	1.57%	1,303.14	1,323.65	1.57%
2. 4088 J2	1,197.16	1,231.48	2.87%	692.08	711.92	2.87%
3. 4089 J2	1,403.48	1,368.07	-2.52%	811.35	790.88	-2.52%
4. 4083 J2	2,973.14	2,534.47	-14.75%	1,718.77	1,465.18	-14.75%
5. J2+S.FIELD	2,311.15	2,276.71	-1.49%	1,336.08	1,316.17	-1.49%
6. J1+LABOR CAMP	1,347.00	1,364.07	1.27%	778.70	788.57	1.27%
7. 4085 J1	1,972.75	1,965.98	-0.34%	1,140.45	1,136.53	-0.34%
8. 4086 J1	1,764.42	1,919.64	8.80%	1,020.01	1,109.74	8.80%
9. S. COMPLEX	603.46	811.89	34.54%	348.86	469.35	34.54%
10. 4092 F. HOSTEL	2,716.91	2,642.07	-2.75%	1,570.65	1,527.38	-2.75%
11. 0508 F. HOSTEL				472.38	466.77	-1.19%
12. 4091 F. HOSTEL	817.13	807.42	-1.19%	1,383.92	1,480.21	6.96%
13. 5614 S. HUB	2,393.91	2,560.47	6.96%	**12,576.39**	**12,586.35**	**0.1%**
Total AU	**21,754.69**	**21,771.93**	**0.08%**	**12,576.39**	**12,586.35**	**0.08%**

Table 23. Total Scope 2 GHG Emissions by builiding.

Comments:

a. The GHG emissions due to purchased electricity remain almost the same as in the baseline year, albeit with an increase of 0.1%.
b. The GHG emissions of 58% of the sources are above 1000 tCO_2e (highlighted in yellow color).
c. The GHG emissions of 50% of the sources in the performance year (highlighted in green color) are less than those in the Baseline year.

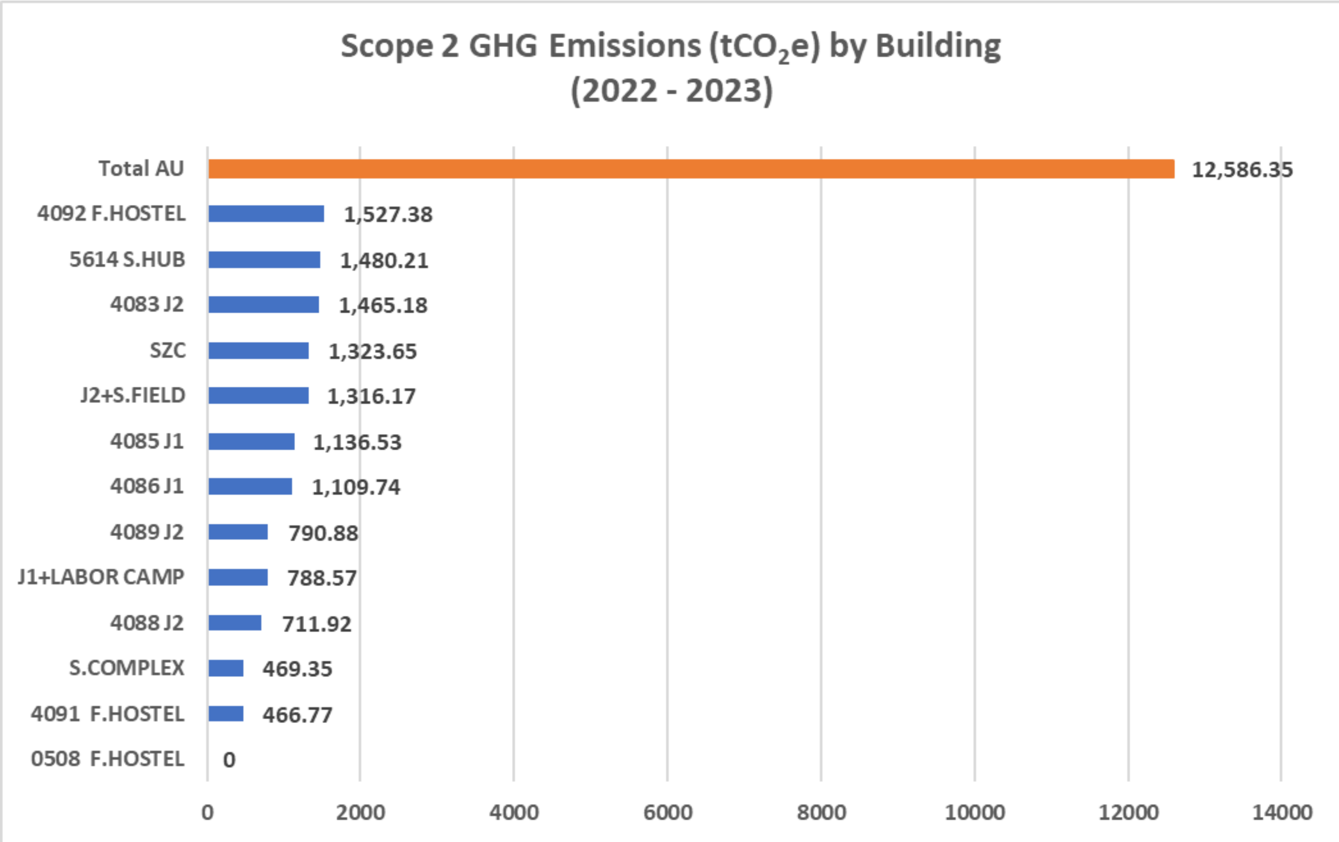

Figure 8. Scope 2 GHG emissions by building during 2022 – 2023,

Table 24. Monthly Scope 2 GHG emission by byulding in (2022 – 2023).

	SZC	4088 J2	4089 J2	4083 J2	J2+S.FIELD	J1+LABOR CAMP	4085 J1	4086 J1	S.COMPLEX	4092 F.HOSTEL	0508 F.HOSTEL	4091 F.HOSTEL	5614 S.HUB
Sep-22	135.80	62.39	130.21	170.51	169.35	72.15	127.86	140.36	40.06	151.30	-	37.59	151.03
Oct-22	123.75	76.73	145.20	175.25	178.56	87.31	132.11	142.66	42.48	149.88	-	39.28	159.62
Nov-22	117.83	74.82	139.43	151.77	139.33	82.62	114.33	119.11	37.22	141.03	-	41.22	142.11
Dec-22	105.41	63.10	116.28	100.53	100.83	65.18	86.58	83.65	33.24	90.63	-	37.89	81.11
Jan-23	80.74	45.05	88.40	82.79	58.43	40.47	52.00	44.81	26.89	112.13	-	39.38	93.75
Feb-23	75.32	41.36	82.90	64.57	46.39	39.78	42.58	30.94	19.63	128.35	-	39.74	119.51
Mar-23	92.36	48.74	92.90	99.48	78.30	55.59	75.09	59.72	37.31	102.70	-	38.05	89.59
Apr-23	96.49	54.41	98.54	104.82	58.92	58.94	73.62	56.51	43.93	105.47	-	39.97	99.22
May-23	89.74	48.60	92.37	81.21	52.64	51.04	57.27	40.98	34.48	91.61	-	37.72	83.73
Jun-23	146.97	65.07	130.59	163.05	164.35	88.80	144.50	155.13	59.57	169.41	-	37.09	167.34
Jul-23	136.69	63.55	122.88	141.23	146.33	68.73	118.63	123.30	49.73	147.70	-	36.58	147.02
Aug-23	122.54	68.11	128.37	129.97	122.76	77.96	111.96	112.58	44.80	137.18	-	42.25	146.17
Total	1,323.65	711.92	1,368.07	1,465.18	1,316.17	788.57	1,136.53	1,109.74	469.35	1,527.38	-	466.77	1,480.21

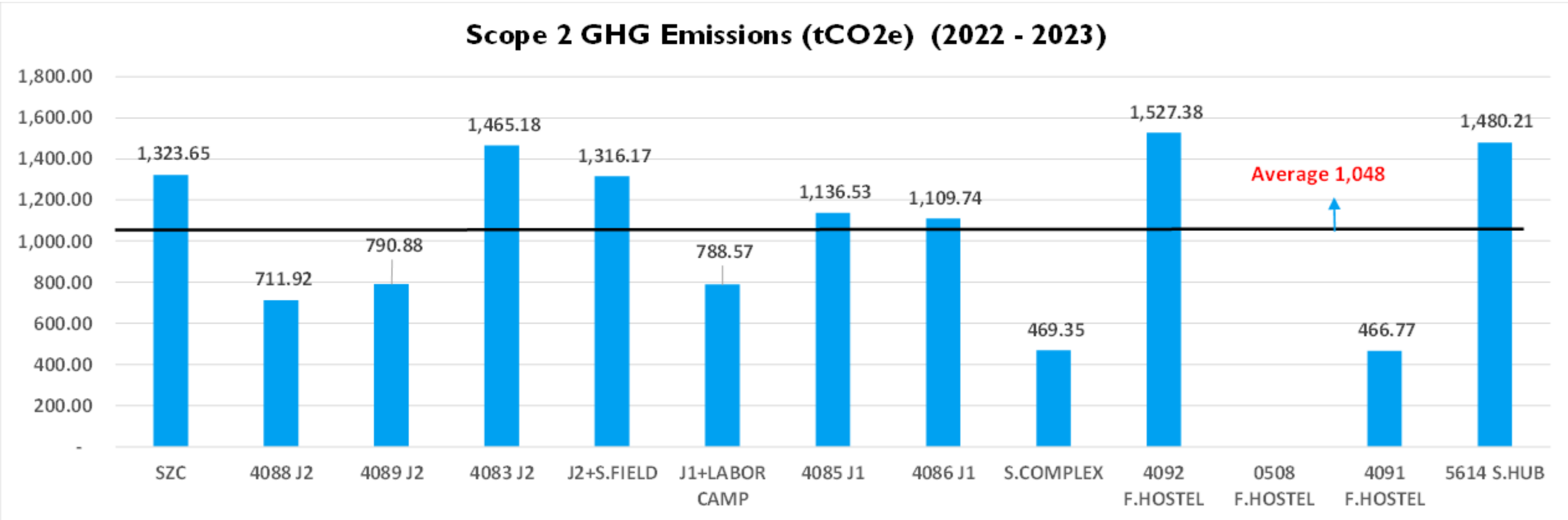

Figure 9. Monthly Scope 2 GHG emissions by building (2022 – 2023).

6. SCOPE 3: INDIRECT GHG EMISSIONS

Scope 3 indirect GHG emissions attributed to Ajman University, occurred from the consumptions of Upstream Activities (categories 1 to 7), listed in the following table:

Category	Emission Sources	Status
1. Purchased goods and services	Food & Beverages, Printing Papers, Toilet Papers, Tissue Papers, Water, and Cloud Services.	Included
2. Capital goods	IT Equipment, Office Furniture, Medical Equipment	Included
3. Fuel- and energy-related activities	Transmission and Distribution (T&D) losses of purchased electricity.	Included
4. Upstream T&D	T&D of Purchased Good and Capital Good	Included
5. Waste generated in operations	Wastewater, General Waste, Medical Waste, Food Waste, Paper Waste.	Included
6. Business travel	Travel and accommodation of employees/contractors.	Included
7. Employee commuting	Employee commuting from and to AU.	Included
8. Upstream leased assets	Operation of assets leased by AU (lessee) in the reporting year and not included in scopes 1 or 2.	Not applicable
9. Downstream T&D	T&D of products sold by the organization.	Not applicable
10. Processing of sold products	Processing of intermediate products sold by the organization.	Not applicable
11. Use of sold products	Use of sold goods that require energy to operate.	Not applicable
12. End-of-life treatment of sold products	Waste disposal and treatment of sold products.	Not applicable
13. Downstream Leased Assets	Emissions from the operation of assets that are owned by AU company and leased to other entities.	Not applicable
14. Franchises	Emissions from the operation of franchises to sell or distribute another company's goods or services within a certain location.	Not applicable
15. Investments	Emissions associated with AU's investments.	Not applicable

Table 25. List of Scope 3 Categories.

6.1 Axosomatic Comments

AU provided all Upstream data (categories 1 to 7) related to scope 3. AU does not lease any assets and does not have operations related to Downstream.

Employee commuting includes commuting data of faculty, staff, and students. To obtain commuting data, Axosomatic designed a survey questionnaire and submitted it to AU Office of Sustainability (AUOS), which was then sent by the AUOS to their employees and students. The response rates were 71.6% students, 9.5% faculty, and 18.9% staff. Axosomatic used statistical tools and a conservative approach to estimate the commuting data for the entire AU population.

6.2 Scope 3 Emissions Breakdown

The below table presents the emissions related to AU scope 3 activities. Please note that because of the lack of local data, the WTT data does not include emissions related to purchased electricity.

Total Scope 3 Emissions (2022 – 2023)				
Category 1				
Purchased Good & Services	Unit	Consumption	tCO2e	% of Total Scope 3
Food & Beverages	USD	64,302.00	25.548	0.332%
Food & Beverages	ton	21.87	80.941	1.051%
Printing Papers	ton	7.50	6.896	0.090%
Toilet Papers	ton	14.50	13.331	0.173%
Tissue Papers	ton	3.75	3.448	0.045%
Water	m3	42,015.95	11.428	0.148%
Cloud Services	Euros	582,379.10	534.017	6.932%
		Total Category 1 GHG Emissions	**675.609**	**8.770%**
Category 2				
Capital Assets	Unit	Consumption	tCO2e	% of Total Scope 3
IT Equipment	Quantity	1,077	675.471	8.769%
Furniture	Euros	2,648,783	2428.936	31.531%
Medical Equipment	Euros	3,187,114	2922.581	37.939%
		Total Category 2 GHG Emissions	**6,026.988**	**78.239%**
Category 3 & 4				
T&D Loss and Upstream T&D	Unit	Consumption	tCO2e	% of Total Scope 3
T&D Loss - Purchased Electricity	MWh	21,772	0.3	0.004%
T&D - Purchased Good	KM	34,448	6.782	0.020%
Well-To-Tank (WTT)[24]			155.514	
		Total Category 3 & 4 GHG Emissions	**162.596**	**2.024%**
Category 5				
Waste	Unit	Consumption	tCO2e	% of Total Scope 3
Wastewater	m3	39,915.000	10.857	0.141%
General Waste	ton	204.383	4.351	0.012%
Plastic Waste	ton	11.883	0.253	0.002%
Medical Waste	ton	12.250	0.261	0.011%
Food Waste	ton	8.474	0.18	0.001%
		Total Category 5 GHG Emissions	**15.902**	**0.269%**
Category 6				
Business Travel - Air	passenger.km	4,872,014.08	801.58	10.406%
Business Travel - Land	passenger.km	1,421.94	4.88	0.047%
		Total Category 6 GHG Emissions	**806.46**	**9.279%**
Category 7				
Commuting	Unit	Consumption	tCO2e	% of Total Scope 3
Employee Commuting	KM	12,052.00	2.094	0.027%
Student Commuting	KM	87,890.89	13.66	0.177%
	Total Category 7 GHG Emissions	**99,942.89**	**15.754**	**0.205%**
		Total Scope 3	**7,703.312**	

Table 26. Scope 3 emissions breakdown.

[24] Detailed emissions are provided in section 6.5.

6.3 Scope 3 Emissions Summary by Category

The following 2 tables represent, respectively, the scope 3 emissions for the performance year 2022-2023 and the comparison to the baseline year 2021-2022.

Performance Year (2022 – 2023)			
Category	**Descriptions**	**tCO2e**	**% of Total**
1. Purchased goods and services	Food & Beverages, Printing Papers, Toilet Papers, and Tissue Papers. Water, Cloud Services.	675.609	8.770%
2. Capital goods	IT Equipment, Office Furniture, and Medical Equipment	6,026.988	78.239%
3. Fuel- and energy-related activities	Transmission and Distribution Loss, WTT,	155.814	2.023%
4. Upstream T&D	T&D of Purchased Good and Capital Good	6.782	0.088%
5. Waste generated in operations	Wastewater, General Waste, Medical Waste, Food Waste, Paper Waste.	15.902	0.206%
6. Business Travel	Faculty and staff travel paid by AU	806.46	10.469%
7. Employee commuting	Employee and Student commuting from and to AU.	15.754	0.205%
	Total Scope 3 GHG Emissions	7,703.31	100.000%

Table 27. Scope 3 Emissions Summary for 2022-2023

Baseline Year vs Performance Year				
Category	**Descriptions**	**tCO2e 2021 - 2022**	**tCO2e 2022 - 2023**	**% Difference**
1. Purchased goods and services	Food & Beverages, Printing Papers, Toilet Papers, and Tissue Papers. Water, Cloud Services.	118.783	675.609	468.77%
2. Capital goods	IT Equipment, Office Furniture, and Medical Equipment	6740.846	6026.990	**-10.59%**
3. Fuel- and energy-related activities	Transmission and Distribution Loss, WTT.	159.171	155.814	**-2.11%**
4. Upstream T&D	T&D of Purchased Good and Capital Good	1.532	6.782	342.69%
5. Waste generated in operations	Wastewater, General Waste, Medical Waste, Food Waste, Paper Waste.	20.919	15.902	**-23.98%**
6. Business Travel	Faculty and staff travel paid by AU	604.847	806.463	33.33%
7. Employee commuting	Employee and Student commuting from and to AU.	15.652	15.754	0.65%
	Total Scope 3 Emissions	7,661.808	7,703.314	0.54%

Table 28. Comparison of emissions data between 2021-2022 and 2022-2023.

6.4 Scope 3 Emissions Comparison

The following tables and figures present, respectively, the GHG emissions associated with the sources in each category, as a percentage of the total Scope 3 GHG emissions during the reference year 2022 – 2023, and the comparison with the baseline year 2021- 2022:

6.4.1 Category 1: Purchase Goods

Scope 3: Category 1 Emissions Breakdown 2022 - 2023				
	Unit	Consumption	tCO2e	% Total
Food & Beverages	USD	64,302.000	25.548	3.78%
Food & Beverages	ton	21.868	80.941	11.98%
Printing Papers	ton	7.500	6.896	1.02%
Toilet Papers	ton	14.500	13.331	1.97%
Tissue Papers	ton	3.750	3.448	0.51%
Water	m3	42,015.951	11.428	1.69%
Cloud Services	Euros	582,379.100	534.017	79.04%
		Total	**675.609**	**100.00%**

Scope 3: Category 1 Emissions – Baseline Year vs Performance Year			
	2021 – 2022 (tCO_2e)	2022 – 2023 (tCO_2e)	% Difference
Food & Beverages (F&B)	40.212	106.489	164.82%
Printing Papers	7.631	6.896	-9.64%
Toilet Papers	1.011	13.331	1218.18%
Tissue Papers	6.896	3.448	-50.00%
Water	19.863	11.428	-42.46%
Cloud Services	43.170	534.017	1137.01%
Total	118.783	675.609	468.77%

Table 29. Category 1 emissions breakdown.

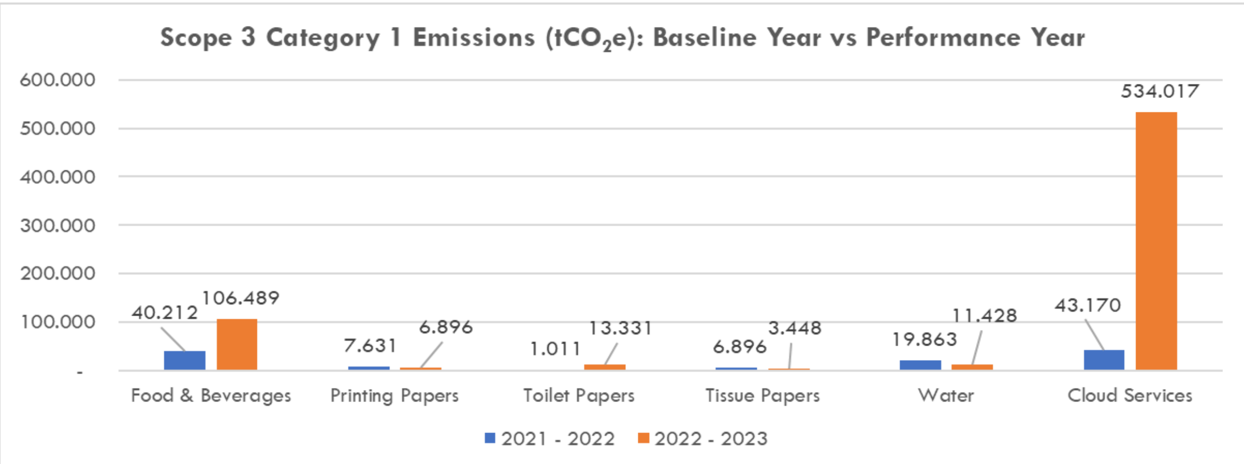

Figure 10. Category 1 emissions: Baseline Year vs. Performance Year.

Comments

1. The emissions related to consumption of F&B, toilet papers, and cloud services have increased in the performance year compared to baseline.
2. The emissions related to consumption of printing papers, tissue papers, and water have decreased.
3. Emission related to cloud services is increased because more data was provided in the performance year, compared to the baseline year.

6.4.2 Category 2: Capital Goods

Scope 3: Category 2 Emissions Breakdown 2022 - 2023				
	Unit	Consumption	tCO_2e	% Total
IT	Quantity	1,077	675.471	11.21%
Furniture	Euros	2,648,783.30	2,428.936	40.30%
Medical Equipment	Euros	3,187,113.82	2,922.581	48.49%
		Total	**6,026.988**	**100.00%**

Scope 3: Category 2 Emissions – Baseline Year vs Performance Year			
	2021 – 2022 (tCO_2e)	2022 – 2023 (tCO_2e)	% Difference
IT	780.656	675.471	**-13.47%**
Furniture	2,521.860	2,428.936	**-3.68%**
Medical Equipment	3,438.330	2,922.581	**-15.00%**
Total	**6,740.846**	**6,026.988**	**-10.59%**

Table 30. Category 2 emissions breakdown.

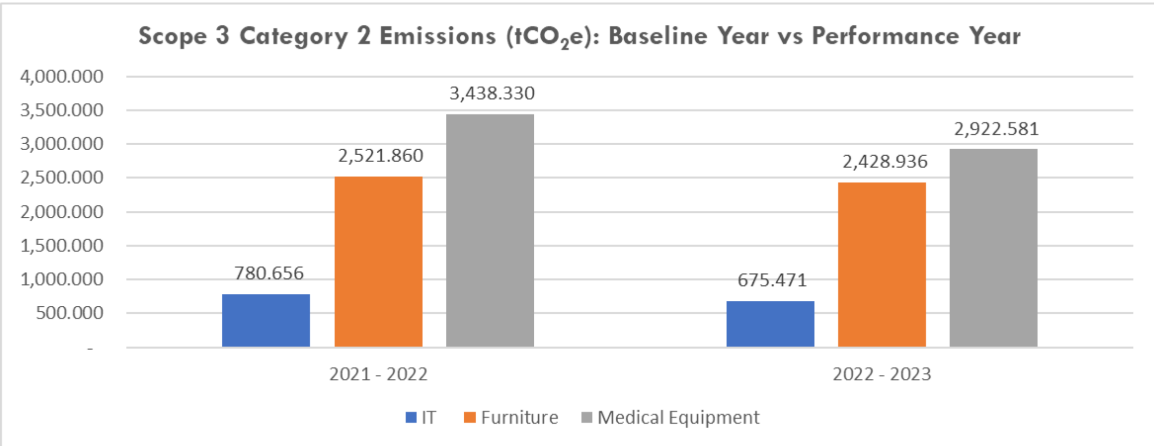

Figure 11. Category 1 emissions: Baseline Year vs. Performance Year.

Comments

1. The emission related to capital goods has decreased because of the depreciation of the capital goods.

6.4.3 Category 3&4: Energy Related Activities

Scope 3: Category 3 & 4 Emissions Breakdown 2022 - 2023				
	Unit	Consumption	tCO2e	% Total
T&D Loss - Purchased Electricity	MWh	21,772	0.300	4.24%
T&D - Purchased Good	KM	34,448.00	6.782	95.76%
			7.082	100.00%

Scope 3: Category 3 & 4 Emissions – Baseline Year vs Performance Year			
	2021 - 2022	**2022 - 2023**	% Difference
T&D Loss - Purchased Electricity	0.3000	0.3002	0.08%
T&D - Purchased Goods	1.5320	6.7818	342.67%
Total	1.8320	7.0820	286.57%

Table 31. Category 3&4 emissions breakdown.

Comments

1. The emission related to T&D loss of purchased electricity remains almost the same compared to the baseline year. This is because the UAE conversion factor has not changed.
2. The T&D emissions of purchased goods in the performance year have increased because of the increased number of deliveries to AU campus.
3. The WTT data is detailed in section 6.5.

6.4.4 Category 5: Waste Generated in Operation

Scope 3: Category 5 Emissions Breakdown 2022 - 2023				
		2022 - 2023		
	Unit	Consumption	tCO2e	% Total
Wastewater	m3	39,915	10.857	68.27%
General Waste	ton	204.383	4.351	27.36%
Plastic Waste	ton	11.883	0.253	1.59%
Medical Waste	ton	12.250	0.261	1.64%
Food Waste	ton	8.474	0.180	1.13%
		Total	15.902	100.00%

Scope 3: Category 5 Emissions – Baseline Year vs Performance Year			
	2021 - 2022	2022 - 2023	% Difference
Wastewater	18.8699	10.8569	**-42.46%**
General Waste	0.9664	4.3507	350.18%
Plastic Waste	0.1682	0.2530	50.42%
Medical Waste	0.8749	0.2608	**-70.19%**
Food Waste	0.0400	0.1804	350.72%
Total	**20.9195**	**15.9018**	**-23.99%**

Table 32. Category 5 emissions breakdown.

Comments

1. The emissions related to General Waste and Food Waste have increased in the performance year, because of increased activities.
2. AU managed to reduce the emissions related to wastewater and medical waste.

6.4.5 Category 6: Business Travel

The emissions related to business travel include air and land business travel, as well as hotel stay, that are paid for by AU for academic purposes.

Business Travel - Land				
	passenger.km	tCO_2e - Hotel Stay	tCO_2 - Drive	Total tCO_2e
Abu Dhabi	1,211.68	2.23	1.55	3.78
Al Ain	138.99	0.32	0.18	0.50
Dubai	71.28	0.51	0.09	0.60
Total	1,421.94	3.06	1.82	4.88
Business Travel - Air				
	passenger.km	tCO_2e - Hotel Stay	tCO_2e - Flight	Total tCO_2e
Business Class - Employee	686,870.00	2.34	236.10	238.44
Economy Class - Employee	4,185,144.08	12.38	550.76	563.14
Total	4,872,014.08	14.72	786.86	801.58

Table 33. Category 7 emissions breakdown.

	2021 - 2022	**2022 - 2023**	**% Difference**
Business Travel - Air	601.19	801.58	33.33%
Business Travel - Land	3.66	4.88	33.33%
	604.85	806.46	33.33%

Table 34. Baseline Year vs Performance Year emissions.

Comments

1. The GHG emissions related to business travel include WTT emissions.
2. Please note that when the GHG report for the baseline year (2021-2022) was prepared in 2023, AU did not provide Axosomatic the business travel data at that time. Consequently, the scope 3 emissions for that year did not include business travel, as agreed with the AU Office of Sustainability.
3. In 2024, the Office of Sustainability managed to collect the business travel data for the performance year (2022-2023) and provided it to Axosomatic.
4. Based on best practice, and to provide meaningful comparison with the baseline year and avoid emissions inflation, Axosomatic applied statistical methods to estimate the business travel data for the baseline year based on the data for the performance year.
5. With this estimation, AU will have a reference to lower the emissions related to business travel for the coming years.
6. In addition, without including the missing data in the baseline year the SBTi target reduction will not be accurate.

6.4.6 Category 7: Employee & Students Commuting

Scope 3: Category 7 Emissions Breakdown 2022 - 2023				
	Unit	Consumption	tCO2e	% Total
Employee Commuting	KM	12,052	2.094	13.29%
Student Commuting	KM	87,890.894	13.660	86.71%
			15.754	100.00%

Scope 3: Category 6 Emissions – Baseline Year vs Performance Year			
	2021 - 2022	2022 - 2023	% Difference
Employee Commuting	2.0254	2.0939	3.38%
Student Commuting	13.5732	13.6598	0.64%
Total	15.5985	15.7537	0.99%

Table 35. Category 7 emissions breakdown.

Comments

Employee commuting includes commuting data of faculty, staff, and students. To obtain commuting data, Axosomatic designed a survey questionnaire and submitted it to AU Office of Sustainability (AUOS), which was then sent by the AUOS to their employees and students. The response rates were 71.6% students, 9.5% faculty, and 18.9% staff. Axosomatic used statistical tools and a conservative approach to estimate the commuting data for the entire AU population.

6.5 Other Related Activities

In the context of GHG protocol, Well-to-Tank (WTT) is included as part of Scope 3 emissions. It refers to the emissions associated with the entire life cycle of a fuel, including its extraction, production, transportation, and distribution, up to the point where it is stored in a vehicle's fuel tank.

Based on the data provided by AU, the WTT related emissions are listed in the following table for the periods baseline year 2021 – 2022 and the performance year 2022 – 2023. It should be noted that there is no published local data for WTT for purchased electricity.

Please note that the WTT emissions are added to category 3 &4, and category 6 in the respective tables and figures presented previously.

WTT Related Emissions		
	2021 - 2022	2022 - 2023
Scope 1	**tCO_2e**	
LPG	92.650	92.650
Refrigerant Leakage	22.355	22.355
Petrol	13.467	10.803
Diesel	25.906	24.144
Total Scope 1	154.378	149.952
Scope 3	**tCO_2e**	
FTSE		
Own Vehicle - KM	2.029	2.042
Own Vehicle - Passenger.Km	1.119	1.126
Public Transportation	0.157	0.158
University Transportation	0.414	0.417
Taxi	0.000	0.000
Total FTSE	3.719	3.742
FTEE		
Own Vehicle - KM	0.474	0.478
Own Vehicle - Passenger.Km	0.075	0.073
Public Transportation	0.000	0.000
University Transportation	0.000	0.000
Taxi	0.037	0.039
Total FTEE	0.586	0.590
T&D F&B	0.300	1.229
Total WTT Emissions	158.982	155.514

Table 36. WTT data for the baseline and performance years.

7. Summary and Recommendations

This report described the Scope 1, Scope 2, and Scope 3 GHG Emissions attributed to Ajman University during the performance year of 2022 – 2023. A comparison was made with the emissions of the baseline year of 2021 – 2022.

7.1 Notes on Scope 1 Emissions

1. The highest carbon emission in stationary combustion, is attributed to the consumption of LPG. This could be because the data provided were the number of LPG cylinders purchased but not the actual consumption.
    a. Axosomatic recommends recording the consumed quantity of LPG.
2. The carbon emission due to the leakage of refrigerant was based on an estimated value of leakage.
    a. Axosomatic recommends recording the refrigerant leakage by measuring the top up amount.
3. The highest carbon emission in mobile combustion is attributed to the use of diesel-operated buses.
    a. Axosomatic recommends determining the optimum bus trajectory for student transport, which will reduce diesel consumption.
    b. We also recommend replacing the vehicles with hybrid and/or EVs.

7.2 Notes on Scope 2 Emissions

1. The emission due to electricity consumption in the performance year is approximately the same as the baseline year, albeit with 1% decrease.

7.3 Notes on Scope 3 Emissions

1. The complete scope 3 data provided by AU for the performance year allowed for accurate emissions calculation.
2. The emissions related to capital assets is the highest in scope 3, with a 78.24% of the total scope 3 emission.

7.4 Notes on Emissions Reduction Achievements by AU

The following summarize AU achievement in reducing the emissions attributed to its activities in the performance year (2002-2023), in reference to the baseline year (2021-2022):

1. The emission related to the consumption of LPG has been reduced by **32%**.
2. The emission related to the consumption of petrol has been reduced by **19%**.
3. The emission related to the consumption of diesel has been reduced by **11%**.
4. The emission related to capital goods has been reduced by **10.59%**.
5. The emission related to energy related activities has been reduced by **2.18%**.
6. The emission related to the waste generated in operations has been reduced by **23%**.
7. The scope 1 emission has been reduced by **22%**.
8. The emission of scope 1 + scope 2 has been reduced by **1.91**%.
9. The total emission (scope 1, 2, and 3) has been reduced by **1.04%**.

7.5 The Next Step

Ajman University has made considerable and tangible progress in reducing the scope 1, 2, and GHG emissions attributed to its operation during the performance year of 2022 – 2023.

To assist AU in its effort to reduce the emissions further, we have formulated a strategy as part of Axosomatic **Net-Zero Carbon Intelligence** solutions framework provided to AU, without additional charges.

The strategy is based on the last 3 years of GHG emissions reporting performed to AU. Please refer to section 3.4 for a detailed description of the strategy. Our team can work with the Office of Sustainability to implement the strategy and curtail substantial emissions reduction.

ANNEX I: INTRODCUTION TO GHG EMISSIONS[25]

The GHG emissions consist of gases that trap heat in the atmosphere and contribute to the warming of the Earth's surface, causing climate change. The most common gases monitored are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (HFCs, OFCs, and SF_6).

Carbon dioxide enters the atmosphere through burning fossil fuels, solid waste, trees, and other biological materials and certain chemical reactions, and is removed from the atmosphere when it is absorbed by plants as part of the biological carbon cycle.

Methane is emitted during the production and transport of coal, natural gas, and oil, as a result from livestock and other agricultural practices, land use, and by the decay of organic waste in municipal solid waste landfills.

Nitrous oxide is emitted during agricultural, land use, and industrial activities; combustion of fossil fuels and solid waste; as well as during treatment of wastewater.

Fluorinated gases are synthetic greenhouse gases that are emitted from a variety of household, commercial, and industrial applications, and processes. The sources of fluorinated gases are:

1. HFCs gas is used in refrigeration and air conditioning systems, foam insulation, aerosols, fire protection, and solvents.
2. PFCs gas is used in semiconductor manufacturing, aluminum production; production of certain consumer products such as non-stick cookware, stain-resistant textiles, and fire-fighting foam; refrigeration and air-conditioning system.
3. SF_6 is used in magnesium and aluminum production.

1 Scope 1: Direct GHG Emissions

Scope 1 emissions are direct GHG emissions that occur from sources controlled or owned by an organization, such as emissions associated with fuel combustion in boilers, furnaces, vehicles, chemical production, or during research processes.

2 Scope 2: Indirect GHG Emissions

Scope 2 accounts for GHG emissions from the generation of purchased electricity consumed by the company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary. Scope 2 emissions physically occur at the facility where electricity is generated. In another words, the consumption of electricity and water by an organization constitutes scope 2 indirect GHG emission.

3 Scope 3: Indirect GHG Emissions

Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions. It is the consequence of the activities of the company but occurs from sources not owned or controlled by the company. Some examples of scope 3 activities are extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services, business travel, and employee commuting to and from the organization's premises.

[25] Overview of Greenhouse Gases | US EPA

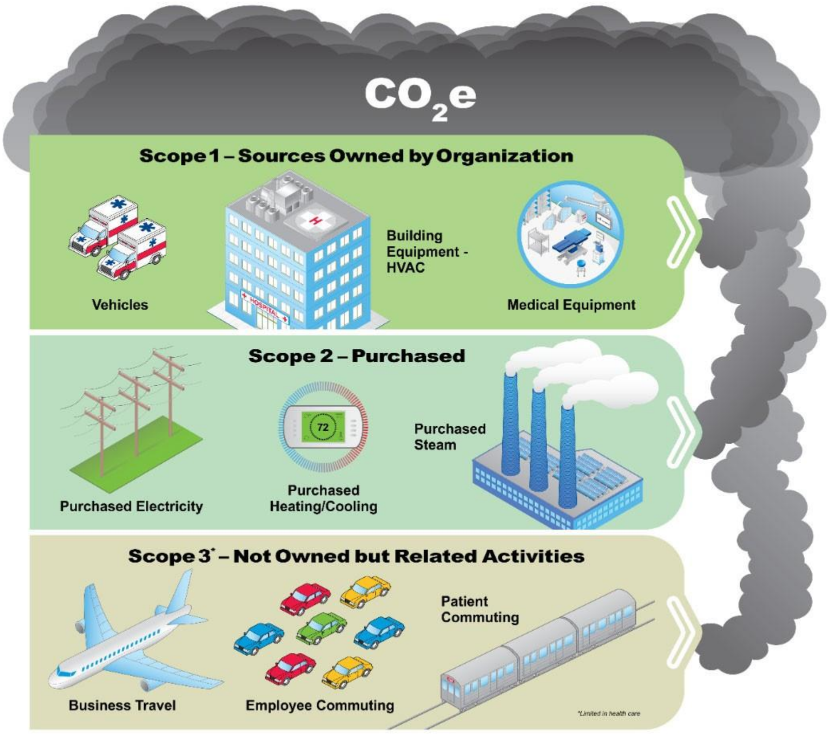

Figure 13.Illustration of CO_2e sources. Source US EPA.

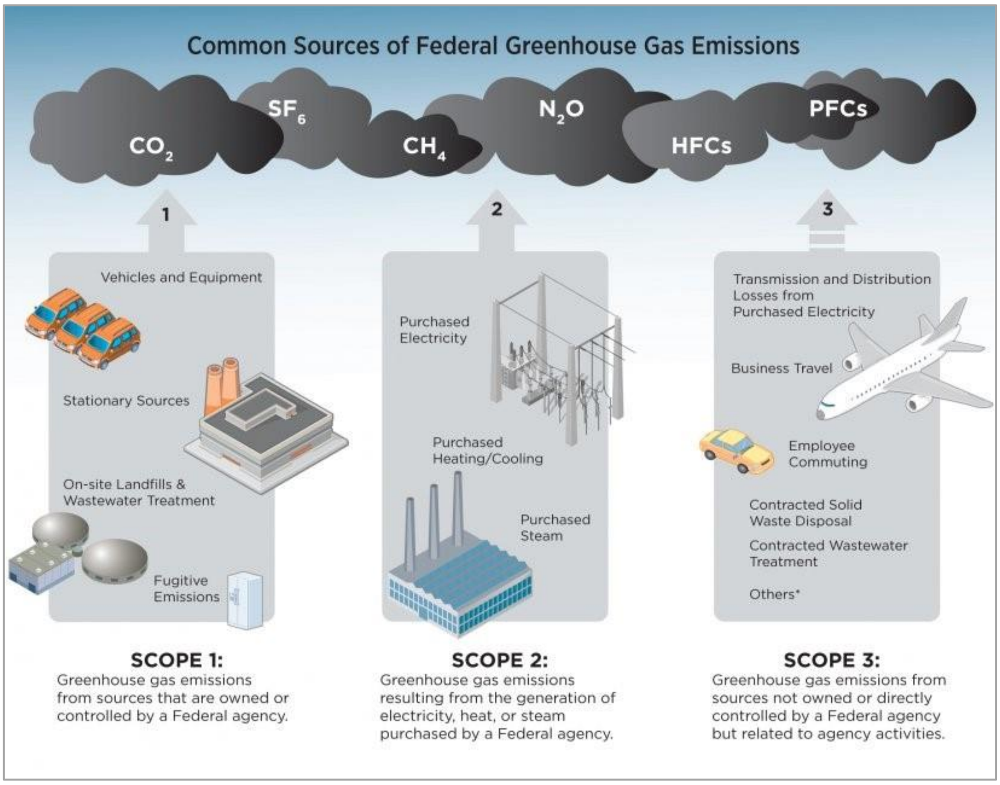

Figure 12. Illustration of sources of GHG gases. Source US EP.

4 Global Warming Potentials[26]

Global warming potential (GWP) is a measure used to compare the impact of different greenhouse gases on global warming over a specific period of time, typically 20, 100, or 500 years. It quantifies how much a particular greenhouse gas can contribute to the greenhouse effect and global warming compared to carbon dioxide (CO2), which is often used as a reference gas with a GWP of 1.

The concept of GWP is important for understanding and addressing climate change because it allows us to assess the relative contributions of various greenhouse gases to the warming of the Earth's atmosphere. Different greenhouse gases have varying abilities to trap heat, and their lifetimes in the atmosphere also influence their warming potential.

Carbon dioxide (CO2) is considered as the reference gas with a GWP of 1. Other greenhouse gases are compared to CO2 in terms of their warming potential. For example, methane (CH4) has a GWP of about 25 over 100 years, which means it is estimated to have 25 times the warming effect of CO2 over that period.

GWP values can be calculated over different time horizons, such as 20, 100, or 500 years. Shorter time horizons emphasize the short-term impact of gases that might have higher warming potential but dissipate more quickly, while longer time horizons consider the longer-term effects of gases with longer atmospheric lifetimes.

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The following table shows the GWP – 100 years for the most common gasses:

GHG	GWP (100 years)
Carbon dioxide (CO_2)	**1**
Methane (CH_4)	**27 - 30**
Nitrous oxide (N_2O)	**298**
Hydrofluorocarbons (HFCs)	See Annex II
Perfluorocarbons (PFCs)	See Annex II
Sulphur hexafluoride (SF_6)	**22,800**

Table 37. List of common gasses and their GWP 100 years.

26 https://www.epa.gov

ANNEX II: GLOBAL WARNING POTENTIAL

Lifetimes, radiative efficiencies and direct (except for CH4) GWPs relative to CO2. For ozone-depleting substances and their replacements, data are taken from IPCC/TEAP (2005) unless otherwise indicated.

Industrial Designation or Common Name	Chemical Formula	Lifetime (years)	Radiative Efficiency ($W\,m^{-2}\,ppb^{-1}$)	Global Warming Potential for Given Time Horizon (years)			
				SAR‡ (100-yr)	20-yr	100-yr	500-yr
Carbon dioxide	CO_2	See below[a]	[b]1.4×10^{-5}	1	1	1	1
Methane[c]	CH_4	12[c]	3.7×10^{-4}	21	72	25	7.6
Nitrous oxide	N_2O	114	3.03×10^{-3}	310	289	298	153
Substances controlled by the Montreal Protocol							
CFC-11	CCl_3F	45	0.25	3,800	6,730	4,750	1,620
CFC-12	CCl_2F_2	100	0.32	8,100	11,000	10,900	5,200
CFC-13	$CClF_3$	640	0.25		10,800	14,400	16,400
CFC-113	CCl_2FCClF_2	85	0.3	4,800	6,540	6,130	2,700
CFC-114	$CClF_2CClF_2$	300	0.31		8,040	10,000	8,730
CFC-115	$CClF_2CF_3$	1,700	0.18		5,310	7,370	9,990
Halon-1301	$CBrF_3$	65	0.32	5,400	8,480	7,140	2,760
Halon-1211	$CBrClF_2$	16	0.3		4,750	1,890	575
Halon-2402	$CBrF_2CBrF_2$	20	0.33		3,680	1,640	503
Carbon tetrachloride	CCl_4	26	0.13	1,400	2,700	1,400	435
Methyl bromide	CH_3Br	0.7	0.01		17	5	1
Methyl chloroform	CH_3CCl_3	5	0.06		506	146	45
HCFC-22	$CHClF_2$	12	0.2	1,500	5,160	1,810	549
HCFC-123	$CHCl_2CF_3$	1.3	0.14	90	273	77	24
HCFC-124	$CHClFCF_3$	5.8	0.22	470	2,070	609	185
HCFC-141b	CH_3CCl_2F	9.3	0.14		2,250	725	220
HCFC-142b	CH_3CClF_2	17.9	0.2	1,800	5,490	2,310	705
HCFC-225ca	$CHCl_2CF_2CF_3$	1.9	0.2		429	122	37
HCFC-225cb	$CHClFCF_2CClF_2$	5.8	0.32		2,030	595	181
Hydrofluorocarbons							
HFC-23	CHF_3	270	0.19	11,700	12,000	14,800	12,200
HFC-32	CH_2F_2	4.9	0.11	650	2,330	675	205
HFC-125	CHF_2CF_3	29	0.23	2,800	6,350	3,500	1,100
HFC-134a	CH_2FCF_3	14	0.16	1,300	3,830	1,430	435
HFC-143a	CH_3CF_3	52	0.13	3,800	5,890	4,470	1,590
HFC-152a	CH_3CHF_2	1.4	0.09	140	437	124	38
HFC-227ea	CF_3CHFCF_3	34.2	0.26	2,900	5,310	3,220	1,040
HFC-236fa	$CF_3CH_2CF_3$	240	0.28	6,300	8,100	9,810	7,660
HFC-245fa	$CHF_2CH_2CF_3$	7.6	0.28		3,380	1030	314
HFC-365mfc	$CH_3CF_2CH_2CF_3$	8.6	0.21		2,520	794	241
HFC-43-10mee	$CF_3CHFCHFCF_2CF_3$	15.9	0.4	1,300	4,140	1,640	500
Perfluorinated compounds							
Sulphur hexafluoride	SF_6	3,200	0.52	23,900	16,300	22,800	32,600
Nitrogen trifluoride	NF_3	740	0.21		12,300	17,200	20,700
PFC-14	CF_4	50,000	0.10	6,500	5,210	7,390	11,200
PFC-116	C_2F_6	10,000	0.26	9,200	8,630	12,200	18,200

Table 38. GWP 100 years for common gases.