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W. Edward Deming

2024

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"GHG emissions blanket the earth and cause global warming and climate change. The world is now warming faster than in any point in history. This poses a risk to all kind of life on earth"

The United Nations

GHG Inventory Report
2024

Calculated and Prepared by
Axosomatic
For
University of Jordan

www.axosomatic.com

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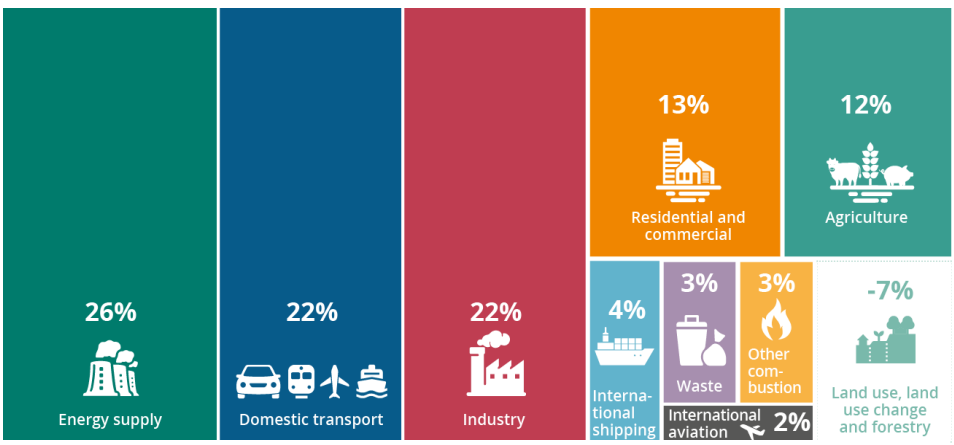

Sources of Greenhouse Gases (GHG) Emissions

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List of Acronyms and Abbreviations

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

This Greenhouse Gas (GHG) Inventory Report is the result of the assessment phase of Axosomatic's Net-Zero Carbon Intelligence solutions framework at the University of Jordan (JU). It presents JU's annual Scope 1, and Scope 3[1] GHG emissions for the period from 01 Jan to 31 Dec 2024. For reference, the years 2019 and 2024 are referred to as the baseline and performance years, respectively.

The report's objectives are to:

1. Establish a precise and rigorous approach to carbon accounting and reporting in alignment with the GHG Protocol Standards.
2. Include all JU-related GHG emissions, including upstream emissions and those from employee commuting.
3. Compare GHG emissions of the performance year against the baseline year.
4. Provide JU with expert recommendations for reducing GHG emissions.
5. Validate JU's performance in managing GHG emissions.
6. Enhance JU's ranking.

The GHG Protocol, widely recognized for its rigor, is adopted across private and public sectors for emissions accounting. The calculation of GHG emissions in this report is based on methodologies from the GHG Protocol, CEDA, CDP, EPA, GRI, GWP, IPCC, ISO, SBT, SBTi, WBCSD, WRI, and local energy data

Summary of GHG Emissions for the Performance Year

The following table summarizes the GHG emissions attributed to JU for 3 years:

	2019 (Baseline Year)	2023		2024 (Performance Year)		
Description	GHG Emission (tCO_2e)	GHG Emission (tCO_2e)	% Difference Baseline Year	GHG Emission (tCO2e)	% Difference Baseline Year	Year-on-Year %
Scope 1: Direct GHG Emission	3,877	5,396	39.18%	5,795.64	49.49%	7.41%
Scope 2: Indirect GHG Emission	8,381.00	0	-100.00%	0.00	-100.00%	0%
Scope 1 + Scope 2	12,258.00	5,396	-55.98%	5,795.64	-52.72%	7.41%
Scope 3: Indirect GHG Emissions	-----			7,567.43		
Total GHG Emissions	24,516.00	5,396.00	-77.99%	13,363.07	-45.49%	

Table 1. Summary of GHG Emissions.

The University of Jordan commenced assessing its GHG emissions in 2019 (The baseline year) and managed to reduce its Scope 2 emissions to Zero by installing 16 MW solar PV system that covers its electricity consumptions. It should be noted that during the previous years, Scope 3 emissions were not assessed. This report contains the Scope 3 emissions

The above table summarizes the emissions in the baseline year, in 2023, and in the performance year 2024. The following are observed from the table:

1. Scope 1 in 2024 is greater than the scope 1 in 2023 by 7.41%. The refrigerant leakage was not counted in the previous year by UJ.

[1] JU has achieved 100% reduction in its Scope 2 emission by installing and operation a 16 MW PV system.

2. Scope 3 emissions, though it is in the average range, it did not include the indirect emissions related to the suppliers transportation to JU campus. This data will be included in the subsequent years.
3. JU maintained a 100% reduction in Scope 2 emissions.
4. The total emissions in the performance year is 46% lower that that in the baseline year.

Breakdown GHG Emissions

The tables below and the chart show the breakdown of the GHG emissions at JU for the performance year 2024. Compared to other universities in the region and worldwide, the GHG emissions are considered to be normal. Based on available data, the high percentage of Scope 3 emissions is normal, and it could be controlled by following our strategy outlined in the report.

Description	tCO_2e	% of Total
Scope 1: Direct GHG Emission	5,795.64	43.37%
Scope 2: Indirect GHG Emission	0.00	0.00%
Scope 1 + Scope 2	5,795.64	43.37%
Scope 3: Indirect GHG Emissions	7,567.43	56.63%
Total GHG Emissions	**13,363.07**	**100.00%**

Table 2. GHG Emissions Summary.

Source	tCO2e	% of Total Emission
S1 Stationary Combustion - LPG Diesel (25.09%)	5,107.28	38.22%
S2 Stationary Combustion - Refrigerant Leakage (1.01%)	205.73	1.54%
S1 Mobile Combustion - Petrol (0.61%)	124.87	0.93%
S1 Mobile Combustion - Diesel (1.76%)	357.76	2.68%
S2 Electricity (0%)	0.00	0.00%
S3 Purchased goods and services (5.58%)	1,135.50	8.50%
S3 Capital goods (5.52%)	1,124.14	8.41%
S3 Fuel- and energy- related activities (12.65%)	2,576.09	19.28%
S3 Waste generated in operations (41.82%)	1,517.60	11.36%
S3 Employee & student commuting (5.64%)	1,148.72	8.60%
S3 Business Travel (0.32%)	65.38	0.49%
Total GHG Emissions	**13,363.07**	100%

Table 3. GHG Emissions Breakdown.

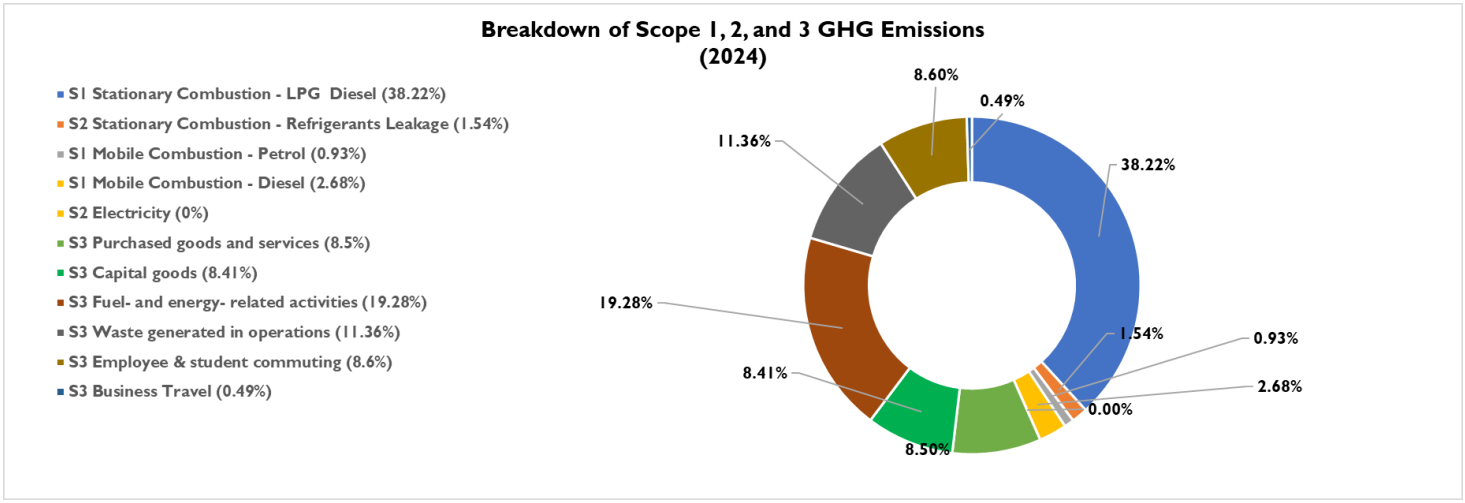

Figure 1. GHG Emissions Breakdown.

The report is divided into 7 sections. Section 1 describes the institutional boundary, parameters, data assumption and methodology. Section 2 presents the emissions benchmarking metrics adopted to compare the effectiveness of institutions' effort in reducing their emissions. Sections 3 to 5 describe, respectively, the calculated scope 1, 2, and 3 emissions based on the provided data. Section 6 describes the reduction plan and target based on SBTi, and Section 7 presents a summary and recommendations.

1. INTRODUCTION

This section describes an overview of the University of Jordan (UJ), the institutional boundary, the institutional parameters, data assumption and methodology.

1.1 Institutional Description[2]

The University of Jordan (UJ), established in 1962 by a Royal Decree, is Jordan's largest and first university. Located in the capital city of Amman, JU has developed into a leading global educational institution, known for its commitment to excellence and diversity in academic offerings. According to the QS World University Rankings 2025, JU is ranked among the top 400 universities worldwide.

The University of Jordan (JU) is steadfast in its commitment to becoming a regional and global leader in sustainability by embedding Environmental, Social, and Governance (ESG) principles into every facet of its operations. This comprehensive sustainability strategy aligns with globally recognized frameworks, including the United Nations Sustainable Development Goals (SDGs), the GHG Protocol, ESG standards, and other best practices. With 2019 as the baseline year, JU has set ambitious yet achievable goals for 2030 and 2050, ensuring meaningful contributions to a sustainable future while fostering innovation, equity, and resilience.

As part of its transformative journey toward a sustainable campus, JU has implemented a groundbreaking green renovation initiative that prioritizes sustainable heating, cooling, and lighting through a three-tiered approach: energy conservation, energy efficiency, and renewable energy integration.

1. 2 Institutional Boundary

Descriptive information	Company response
Company name	University of Jordan
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 restaurants, transportation, and housing for students.
The reporting period covered	01 Jan – 31 Dec 2024
A list of scope 3 activities included in the report	Upstream
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 University of Jordan
The year chosen as Baseline year and rationale for choosing the Baseline year	2019
Carbon reduction plan and target by at least 2050.	University of Jordan has implemented PV solar system that supplies all its electricity in the campus, and thus, its scope 2 emission is Zero. It is in the process of implementing a solution framework to optimize its operations and reduce overall Scope 2 GHG emissions by 50%, by 2030, Achieve carbon neutrality (Net-Zero emissions) by 2050

Table 4. Institutional Boundary.

[2] Source: University of Jordan.

1.3 Institutional Parameters[3]

The table below presents the University of Jordan's parameters in accordance with the GHG Protocol. It is important to note that JU operates two campuses: the main campus in Amman and a branch campus in the city of Aqaba. Additionally, the University owns and operates a university hospital. This report covers GHG emissions associated exclusively with educational activities at the main campus. Emissions data from the branch campus and the hospital will be included in future reporting years.

Organizational Boundary	
Descriptions	Quantity
Number of campuses owned	2
Number of campuses rented	0
Number of Buildings in the Campus	125
Number of buildings owned for student housing	4
Number of buildings rented for student housing	0
Total FT Faculty	2161
Total PT Faculty	1936
Total FT Staff	2343
Total PT Staff	0
Total Employee	6440
Employee FTEE[4]	5,149.33
Number of employees (faculty and staff)resident on-site	67
Total FT Students	25515
Total PT Students	14825
Total Student	40,340.00
Students FTSE[5]	30,456.67
Number of students resident on-site	2519
Total campus area (m2)	1,310,000
Total area occupied by buildings	190,071
Gross Floor Area of all building (m2)	599,639
Total green area (m2)	451,455
Number of trees	152,635
Total grass area (m2)	15,1749

Table 5. Institutional parameters.

1.4 Data Assumption & Estimation

The following table provides information about the data submitted by JU for the 2024 performance year, and methods used by Axosomatic to estimate the missing data:

Scope 1	Provided Data	Comments/Recommendations
Stationary Combustion	JU does not consume LPG. It consumes diesel for internal operations. JU provided consumption data of Refrigerant leakage (4 refrigerants).	JU provided annual consumption data for diesel. The refrigerant data provided by JU was total consumption and not leakage. Axosomatic assumed 10% of the data provided as leakage.
Mobile Combustion	JU was able to provide data on the models and manufacturing years of their fleet of cars, buses, and other vehicles; and the petrol and diesel consumption for each vehicle.	The provided data was very helpful to determine the GHG emissions.

[3] Source: University of Jordan.
[4] Employee Full-time Equivalent based on international best practice.
[5] Student Full-time Equivalent based on international best practice.

Scope 2	Provided Data	Comments/Recommendations
Purchased Electricity	JU installed and operates a PV system. The system capacity is 16 MW, last year its production is 25.4 GWh/year, which covers the demand of the campus 16.5 GWh.	Scope 2 emissions is Zero
Scope 3	**Provided Data**	**Comments/Recommendations**
Purchased goods and services	JU operates restaurants on its campus, but there are cafeterias operated by external business. Data about Food & Beverages, Printing Papers, Toilet Papers, Tissue Papers, Water, online advertising, and Cloud Services were provided. Cafeteria operated by external businesses are not included in this report	We suggest that JU improves its procurement procedures, the product and process Life Cycle Assessment to improve GHG emissions calculation accuracy. We also recommend that JU deals with suppliers that are GHG compliant.
Capital goods	IT Equipment, Office Furniture, Medical Equipment, and books were provided.	Sufficient data was provided to estimate the GHG emissions related to the IT equipment and furniture. Equipment depreciation was not applied.
Fuel- and energy- related activities	Transmission and Distribution (T&D) losses of purchased electricity, and WTT	T&D losses of purchased electricity are not included since JU operates its own PV systema that supplies its consumption of electricity. Emissions related to the PV system was calculated, and the WTT (Well-To-Tank) emissions were calculated based on Scope 1 and employee and student commuting.
Upstream T&D	T&D of Purchased Good and Capital Good	Data for T&D of purchased goods was not provided. JU is in the process of restructuring its procurement processes in line with the GHG standard.
Waste generated in operations	Wastewater, General Waste, Medical Waste, Food Waste, Paper Waste.	JU provided complete data for all types of waste. Axosomatic recommends that JU separate the waste types as per international standards.
Business travel	Travel and accommodation of employees/contractors.	Complete business travel data, by air, was provided. WTT is included in the calculation.
Employee commuting	Employee commuting from and to AU.	Axosomatic designed a survey questionnaire and submitted it to JU Global Rankings & International Accreditation Office, which was then sent by JU to their employees and students. The responses were not sufficient. Axosomatic applies statistical methods to scale to the entire JU population.

Table 6. 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 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 location-based emissions factors, where appropriate.

Note

It should be noted that, because of the rounding of digits, the figures may not add up exactly to the total tCO2e of the same emission in different tables.

2. GHG EMISSIONS BENCHMARKING METRICS

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

Description	Year 2029 (Baseline)	Year 2024 (Performance Year)
Scope 1: Direct GHG Emission[6] (tCO_2e)	3,877.00	5,795.64
Scope 2: Indirect GHG Emission[1] (tCO_2e)	8,381.00	0.00
Total (tCO_2e)	12,258.00	5,795.64
FTEF[2]	4113	5149.33
FTSE[2]	30,846	30,457
GHG/FTEE and FTSE[7]	0.35	0.16
Weighted Campus Users	26,861.25	27,351.00
GHG/Weighted Campus Users[8] (tCO_2e)	0.456	0.212

Table 7. GHG Emissions and Metrics.

The Weighted Campus Users (WCU) metric, developed by the Association for the Advancement of Sustainability in Higher Education (AASHE), measures how intensively an institution's population utilizes campus resources, particularly for residential institutions. Institutions with a high percentage of on-campus residents typically have higher GHG emissions, electricity and water consumption, and waste generation compared to non-residential institutions.

The metric, GHG per Weighted Campus User (GHG/WCU), is calculated based on Scope 1 and Scope 2 emissions, total full-time employee and student equivalents, and the number of students residing in institution-owned housing.

A decrease in GHG/WCU from a baseline year to a performance year reflects the effectiveness of the institution's emissions reduction efforts.

In the table above, the GHG/WCU value in the performance year is lower than that in the baseline year, indicating a 54% reduction in the GHG emissions (scope 1 + scope 2).

[6] Source: Axosomatic (www.axosomatic.com)
[7] FTEE (Full-Time Employe Equivalent) and FTSE (Full-Time Student Equivalent), based on international standards.
[8] Scope 1 and Scope 2 only.

2.1 GHG Emissions Benchmarking[9]

The table below compares UJs Scope 1 and Scope 2 GHG emissions and related metrics to those of selected international universities. Two key metrics, GHG per Weighted Campus User (WCU) and % Decrease, are used to assess the effectiveness of each institution's GHG reduction plan on the path to Net-Zero Carbon.

The % Decrease metric shows the percentage reduction in total GHG emissions (Scope 1 and Scope 2) per WCU for the performance year compared to baseline years. A higher positive % Decrease indicates a more effective reduction plan, while a negative % Decrease signals an increase or an insufficient reduction in emissions relative to the baseline year.

								Performance Year		Baseline Year	
	Scope 1	Scope 2	TFES[10]	TFE[11]	WCU[12]	GHG/WCU[13]	% Reduction[14]	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
University of Jordan	**5,795.64**	**0.00**	**30,456.67**	**5,149.33**	**27,351.00**	**0.212**	**54%**	**01-Jan-24**	**31-Dec-24**	**01-Jan-19**	**31-Dec-19**

Table 8. Benchmarking of JU GHG with international HEIs.

[9] Data compiled by Axosomatic (www.axosomatic.com). There are no official data published by other institutions in the UAE.
[10] Total Full Time Equivalent Students.
[11] Total Full-time Equivalent Employees.
[12] Weighted Campus Users.
[13] GHG Emissions per Weighted Campus Users.
[14] All values above 30%, indicate reductions in the GHG emissions with respect to the Baseline year.

3. SCOPE 1: DIRECT GHG EMISSIONS

Scope 1 direct GHG emissions attributed to the activities at the University of Jordan, occurred from stationary combustion of Diesel, refrigerant leakage, and mobile combustion of petrol and diesel operated cars, buses, pickups, and trucks owned by UJ.

4.1 Scope 1 Direct GHG Emissions

Table 14 below lists the consumption data provided by JU for Diesel, Refrigerant Leakage, petrol, and diesel, and the related GHG emissions.

Source	Unit	QTY	tCO2e	% Total
Stationary				
Diesel	Liters	1,918,912.00	5,107.28	88.12%
Refrigerant Leakage				
HCFC-22/R22	Kg	36.72	64.63	1.12%
R410	Kg	9.04	17.39	0.30%
R404	Kg	6.54	25.79	0.44%
R134A	Kg	20.40	97.92	1.69%
Sub-Total			5,313.01	91.67%
Mobile				
Diesel - Bus	Liters	134,419.00	357.76	6.17%
Petrol - Car	Liters	53,052.46	124.87	2.15%
Sub-Total			482.63	8.33%
Total Scope 1 GHG Emissions			5,795.64	100.00%

Table 9. Summary of Scope 1 Data provided by JU.

Comments

1. The emission related to the stationary consumption of Diesel is higher than the emissions from other sources. JU is recommended to control this emission.
2. The emissions related to the refrigerant leakage are based on 10% of the total consumption data provided by UJ. This is because the University does not count the leakage. Axosomatic applied this percentage based on the best international practices.
3. Compared to some universities in the region and worldwide, the total Scope 1 GHG emissions is normal, but it should be reduced.

4. SCOPE 2: INDIRECT GHG EMISSIONS

The University of Jordan installed and operates its own solar PV system. The system capacity is 16 MW, last year its production is 25.4 GWh/year, which covers the demand of the campus 16.5 GWh. The Scope 2 GHG emission is Zero.

5. SCOPE 3: INDIRECT GHG EMISSIONS

Scope 3 indirect GHG emissions attributed to UJ, 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	Not Included[15]
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 JU (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 JU 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 10. List of Scope 3 Categories.

6.1 Axosomatic Comments

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

Employee commuting includes commuting data of faculty, staff, and students. Axosomatic designed a survey questionnaire and submitted it to JU Global Rankings & International Accreditation Office, which was then sent by JU to their employees and students. The responses were not sufficient. Axosomatic applies statistical methods to scale to the entire JU population.

[15] JU did not provide the data for the mean of transportation by their suppliers. This will be provided in the subsequent years.

6.2 Scope 3 Emissions Breakdown

The table below presents the emissions related to JU scope 3 activities.

Total Scope 3 Emissions (2023– 2024)				
Category 1	Unit	Consumption	tCO2e	% of Total Scope 3
Bottled Drinking Water	m3	175,640.00	87.82	1.16%
Printing Papers	ton	66.96	73.66	0.97%
Toilet Papers	ton	7.50	11.25	0.15%
Tissue Papers	ton	1.04	1.35	0.02%
Food & Beverage	JOD	422,000.00	168.80	2.23%
Cloud Services	MWh	1,800.00	720.00	9.51%
Books	USD	103,752.00	72.63	0.96%
	Total Category 1 GHG Emissions		**1,135.50**	**15.01%**
Category 2				
Capital Assets	Unit	Consumption	tCO2e	% of Total Scope 3
IT Equipment	JOD	198,296.76	1.20	0.54%
Furniture	JOD	140,968.64	84.58	1.12%
Medical Equipment	JOD	1,557,538.00	998.37	13.19%
	Total Category 2 GHG Emissions		**1,124.14**	**14.86%**
Category 3 & 4				
T&D Loss and Upstream T&D	Unit	Consumption	tCO2e	% of Total Scope 3
Solar PV System			981.12	12.97%
Well-To-Tank (WTT)	Km	8,924,148.00	1,594.97	26.58%
	Total Category 3 & 4 GHG Emissions		**2,576.09**	**26.64%**
Category 5	Unit	Consumption	tCO2e	% of Total Scope 3
General Waster	ton	1,470.00	1470.00	19.43%
Medical Waste	ton	3.87	11.21	0.15%
Food waste	ton	6.00	5.40	0.07%
Wastewater	m3	166,858.00	30.99	0.41%
	Total Category 5 GHG Emissions		**1517.60**	**20.05%**
Category 6	Unit	Consumption	tCO2e	% of Total Scope 3
Business Travel - Air	passenger.km	271,400.00	65.3775	0.86%
	Total Category 6 GHG Emissions		**65.3775**	**0.86%**
Category 7				
Commuting	Unit	Consumption	tCO2e	% of Total Scope 3
Employee Commuting	KM	1,767,096.00	261.55	3.46%
Student Commuting	KM	7,157,052.00	887.17	11.72%
	Total Category 7 GHG Emissions		**1,148.72**	**15.18%**
		Total Scope 3	**7,567.43**	

Table 11. Scope 3 emissions breakdown.

6.3 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 JU, the WTT related emissions are listed in the following table for the performance year. 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	
Source	2024
Scope 1	**tCO_2e**
LPG - Diesel	1,197.57
Refrigerants	0.08
Petrol	32.18
Diesel	83.89
Total Scope 1	**1,313.73**
Scope 3	**tCO_2e**
Own Car	47.86
Carpool	9.01
Taxi	16.69
Public transport	143.17
Motor Bicycle	0.43
Total FTSE	**217.15**
Own Car	37.83
Carpool	10.63
Taxi	1.76
Public transport	13.87
Motor Bicycle	0.00
Total FTEE	**64.09**
Total WTT Emissions	**1,594.97**

Table 12. WTT data for the baseline and performance years.

6. JU REDUCTION PLAN AND TARGETS

A carbon reduction target covering Scope 1, and 3 emissions by 2030 and 2050 refers to UJ's strategic commitment to reduce greenhouse gas (GHG) emissions that are directly produced by its own activities (Scope 1 emissions) and the indirect emissions associated with Scope 3 emissions.

6.1 JU Strategic Reduction Plan

The University of Jordan's bold commitment to achieving Net-Zero emissions by 2050 underscores its role as a catalyst for change. Through this strategy, JU is not only reducing its carbon footprint but also inspiring a culture of sustainability that extends far beyond its campuses. By aligning with international frameworks and setting measurable targets, JU is paving the way for a resilient, equitable, and sustainable future.

Together, we will transform aspirations into action, challenges into opportunities, and vision into reality—ensuring that the University of Jordan remains at the forefront of the global sustainability movement.

Purpose

The purpose of the University Sustainability Strategy is to establish a comprehensive, institution-wide framework that integrates sustainability principles across all academic, operational, and governance functions. It seeks to ensure that the university proactively addresses environmental challenges, fosters inclusive social development, and maintains strong governance practices in alignment with ESG standards, the GHG Protocol, and the United Nations Sustainable Development Goals (UN SDGs).

This strategy aims to guide the university community in making informed, responsible decisions that lead to lasting positive impacts—locally and globally—through education, research, operations, and community engagement.

Scope

This strategy applies to all university entities, including:

- Academic Programs and Curriculum: All faculties and academic departments in integrating Education for Sustainable Development (ESD).
- Research and Innovation: Research centers, faculty, and students engaged in sustainability-related projects and knowledge creation.
- Operations and Campus Services: Facilities, procurement, energy use, water management, transportation, and waste management.
- Human Resources: Staff recruitment, training, diversity, equity, and wellbeing.
- Governance and Leadership: University councils, committees, and executive leadership responsible for ESG-aligned decision-making.
- Student and Alumni Bodies: Student Union, clubs, and alumni associations contributing to sustainability initiatives.
- Community and Global Engagement: Partnerships with industry, NGOs, governments, and other universities for collective action on sustainability challenges.

Vision

To be a transformative, sustainability-driven university that leads innovation and action across education, research, operations, and community engagement, shaping a more equitable, inclusive, and regenerative future.

Mission

To embed sustainability into every aspect of university life—academics, governance, operations, research, partnerships, and community—by aligning with ESG principles, reducing GHG emissions, and contributing meaningfully to the UN SDGs.

Strategic Sustainability Goals

1. Climate Action & Carbon Reduction – Achieve Net-Zero carbon emissions by 2050
2. Sustainable Education – Integrate ESD across 100% of academic programs
3. Sustainability Research Leadership – Advance interdisciplinary sustainability research
4. Sustainable Operations – Embed circular economy, low-carbon, and ethical procurement principles
5. Human Capital for Sustainability – Build capacity among staff, students, and leadership for ESG action
6. Inclusive Engagement & Governance – Foster shared accountability among students, alumni, faculty, and administration
7. Global & Local Partnerships – Collaborate with industries, governments, and communities for impact

ESG & GHG Alignment

ESG Pillar	**University Alignment**
Environmental	GHG reporting (Scopes 1, 2, 3), green campus initiatives, energy transition
Social	Inclusive education, staff wellbeing, community impact, gender equity
Governance	Transparent decision-making, policy compliance, ethical standards

GHG Protocol Alignment

- **Scope 1**: Campus-based direct emissions (fleet, fuel, HVAC)
- **Scope 2**: The University has achieved 100% renewable energy.
- **Scope 3**: Procurement, commuting, travel, waste, alumni/students' impact

Alignment with UN SDGs

SDG	Strategic Contribution
SDG 3	Staff/student wellbeing programs
SDG 4	Quality education & ESD
SDG 5	Gender equality in leadership, HR
SDG 7	Energy efficiency, renewables
SDG 8	Decent work in HR policies
SDG 10	Equity and inclusion for all
SDG 12	Sustainable procurement, consumption
SDG 13	Carbon reduction, climate education
SDG 16	Institutional ethics, transparency
SDG 17	Partnerships with NGOs, UN, academia

Goal 1: Achieve Carbon Neutrality

Interim Target: 2030 | Net-Zero Target: 2050

Objective 1.1

Reduce greenhouse gas (GHG) emissions across all university operations.

Key Result 1.1.1

Achieve a 50% reduction in Scope 1 and 2 GHG emissions by 2030 compared to the 2019 baseline.

Key Result 1.1.2

Achieve carbon neutrality (Net-Zero emissions) by 2050.

Action Plan

- Conduct annual GHG audits and publish findings.
- Transition campus vehicles to electric or hybrid models by 2030.
- Implement energy-efficient HVAC systems across all buildings by 2030.
- Address Indirect Emissions from Business Travel (Scope 3):
- Prioritize virtual meetings, over flights, and carbon-neutral travel options.
- Offset unavoidable business travel emissions through certified carbon offset programs.
- Launch a campus-wide Car-Free Day campaign to promote alternative commuting methods.
- Partner with local public transportation providers to offer discounted passes for students and staff.
- Electrify campus shuttles and expand routes to reduce reliance on personal vehicles.
- Provide incentives for cycling, walking, and carpooling,

Goal 2: Promote Sustainable Resource Management

Interim Target: 2030 | Long-Term Target: 2050

Objective 2.1

Minimize water consumption and enhance water efficiency.

Key Result 2.1.1

Reduce total water consumption by 40% by 2030 compared to 2019 levels.

Key Result 2.1.2

Reduce total water consumption by 60% by 2050 compared to 2019 levels.

Action Plan

- Install low-flow fixtures and water-efficient appliances campus-wide.
- Implement rainwater harvesting systems for irrigation and non-potable uses.
- Conduct annual water audits and report progress publicly.

Objective 2.2

Achieve zero waste to landfill.

Key Result 2.2.1

Divert 70% of waste from landfills through recycling, composting, and reuse by 2030.

Key Result 2.2.2
Achieve zero waste to landfill by 2050.

Action Plan
- Establish a campus-wide waste segregation system.
- Ban single-use plastics across all university operations by 2025.
- Partner with certified recyclers for safe disposal of e-waste and hazardous materials.

Objective 2.3: Promote circular economy practices.
Key Result 2.3.1
Increase procurement of recycled and sustainably sourced materials by 50% by 2030.

Key Result 2.3.2
Establish partnerships with local suppliers to implement take-back programs for all major product categories by 2030.

Action Plan
- Develop guidelines for sustainable procurement practices.
- Train procurement teams on circular economy principles.
- Monitor supplier compliance with sustainability criteria annually.

Goal 3: Foster Education for Sustainable Development (ESD)
Interim Target: 2030 | Long-Term Target: 2050

Objective 3.1
Integrate sustainability into the curriculum.

Key Result 3.1.1
Ensure that 100% of academic programs include SDG-related learning outcomes by 2030.

Key Result 3.1.2
Offer at least 10 interdisciplinary sustainability-focused majors or minors by 2030.

Action Plan
- Establish a Sustainability Curriculum Task Force to guide integration.
- Develop a repository of sustainability learning outcomes for faculty use.
- Launch digital platforms offering microcredentials in sustainability topics.

Objective 3.2
Build capacity among faculty and students.

Key Result 3.2.1
Train 80% of faculty on ESD methodologies by 2030.

Key Result 3.2.2
Engage 50% of students in sustainability-related research or projects by 2030.

Action Plan
- Organize workshops and training sessions on ESD for faculty.
- Create student innovation challenges focused on sustainability solutions.

- Recognize outstanding contributions to sustainability education through awards.

Objective 3.3
Promote lifelong learning and community engagement.

Key Result 3.3.1
Launch annual sustainability awareness campaigns reaching 100% of students by 2030.

Key Result 3.3.2
Partner with 10 local communities annually to address sustainability challenges by 2030.

Action Plan
- Host events like Earth Week and Sustainability Month.
- Collaborate with NGOs and local governments on joint initiatives.
- Provide scholarships to marginalized communities for sustainability education.

Goal 4: Advance Sustainability Research and Innovation
Interim Target: 2030 | Long-Term Target: 2050

Objective 4.1
Increase funding and output for sustainability research.

Key Result 4.1.1
Allocate 20% of total research funding to sustainability-related projects by 2030.

Key Result 4.1.2
Publish 500 peer-reviewed articles on sustainability topics by 2030.

Action Plan
- Establish dedicated sustainability research grants.
- Encourage faculty and students to pursue external funding for sustainability projects.
- Create a database of sustainability research outputs.

Objective 4.2
Strengthen interdisciplinary and collaborative research.

Key Result 4.2.1
Establish 5 interdisciplinary research centers focused on sustainability by 2030.

Key Result 4.2.2
Collaborate with at least 20 international institutions on sustainability research by 2030.

Action Plan
- Form research clusters around key themes like climate action and biodiversity.
- Participate in global sustainability research networks.
- Organize annual research symposia to showcase findings.

Objective 4.3
Translate research into actionable solutions.

Key Result 4.3.1
Develop 10 scalable innovations addressing SDG challenges by 2030.

Key Result 4.3.2
Influence at least 5 national or regional policies based on university research by 2030.

Action Plan
- Partner with industry and government to pilot innovations.
- Publish policy briefs summarizing research findings.
- Engage stakeholders in co-creating solutions.

Goal 5: Ensure Inclusive and Equitable Engagement
Interim Target: 2030 | Long-Term Target: 2050

Objective 5.1
Promote diversity, equity, and inclusion (DEI).

Key Result 5.1.1
Achieve gender parity in leadership positions by 2030.

Key Result 5.1.2
Increase representation of underrepresented groups in faculty and staff by 30% by 2030.

Action Plan
- Conduct DEI training for all staff and students.
- Review hiring and promotion practices to eliminate bias.
- Establish mentorship programs for underrepresented groups.

Objective 5.2
Enhance student and alumni engagement.

Key Result 5.2.1
Engage 70% of students in sustainability-related activities by 2030.

Key Result 5.2.2
Establish a global alumni sustainability network with 1,000 active members by 2030.

Action Plan
- Organize student-led sustainability clubs and events.
- Launch an alumni platform for sharing sustainability success stories.
- Involve alumni in fundraising for green initiatives.

Objective 5.3
Support community well-being.

Key Result 5.3.1
Partner with NGOs and local governments to implement 10 community health and education initiatives by 2030.

Key Result 5.3.2
Provide scholarships to 500 students from marginalized communities by 2030.

Action Plan
- Collaborate with local organizations to address pressing issues.

- Allocate funds for scholarships targeting underprivileged students.
- Measure and report community impact annually.

Goal 6: Align Investments with Sustainability

Interim Target: 2030 | Long-Term Target: 2050

Objective 6.1

Shift investments toward sustainable assets.

Key Result 6.1.1

Allocate 30% of the university's endowment fund to sustainable investments by 2030.

Key Result 6.1.2

Achieve 100% alignment of investments with ESG criteria by 2050.

Action Plan

- Screen investments for ESG compliance.
- Prioritize sectors aligned with SDGs, such as clean energy and education.
- Regularly review investment portfolios for alignment with climate goals.

Objective 6.2

Measure and report impact.

Key Result 6.2.1

Reduce the carbon footprint of the investment portfolio by 50% by 2030.

Key Result 6.2.2

Publish an annual Sustainable Investment Report detailing ESG performance starting in 2024.

Action Plan

- Use TCFD recommendations to assess climate risks.
- Engage with fund managers to improve ESG performance.
- Share progress transparently with stakeholders.

Goal 7: Build Climate Resilience

Interim Target: 2030 | Long-Term Target: 2050

Objective 7.1

Enhance campus infrastructure resilience.

Key Result 7.1.1

Retrofit 50% of existing buildings to meet green building standards by 2030.

Key Result 7.1.2

Ensure all new constructions are Net-Zero energy by 2030.

Action Plan

- Use sustainable materials in construction and renovation.
- Incorporate passive design principles in new buildings.
- Conduct regular assessments of building resilience.

Objective 7.2
Mitigate climate risks.

Key Result 7.2.1
Develop and implement a Climate Action Plan by 2025.

Key Result 7.2.2
Conduct annual climate risk assessments and integrate findings into operational planning by 2030.

Action Plan
- Identify vulnerabilities and prioritize adaptation measures.
- Train staff on emergency preparedness.
- Update plans based on evolving climate science.

Objective 7.3
Promote climate literacy.

Key Result 7.3.1
Train 100% of incoming students on climate action and resilience by 2030.

Key Result 7.3.2
Host an annual Climate Action Summit engaging 1,000 participants by 2030.

Action Plan
- Integrate climate literacy into orientation programs.
- Organize workshops and seminars on climate change.
- Invite experts and policymakers to participate in summits.

Goal 8: Achieve Sustainable Procurement Practices
Interim Target: 2030 | Long-Term Target: 2050

Objective 8.1
Embed sustainability criteria into all procurement processes.

Key Result 8.1.1
Ensure 70% of all procurement decisions include sustainability criteria by 2030.

Key Result 8.1.2
Achieve 100% integration of sustainability criteria into procurement processes by 2050.

Action Plan
- Develop a checklist for evaluating supplier sustainability.
- Train procurement staff on sustainable practices.
- Audit supplier compliance regularly.

Objective 8.2
Prioritize environmentally responsible products and services.

Key Result 8.2.1
Source 50% of purchased goods and services from suppliers with recognized environmental certifications by 2030.

Key Result 8.2.2
Source 90% of purchased goods and services from suppliers with recognized environmental certifications by 2050.

Action Plan
- Prefer suppliers with ISO 14001 or similar certifications.
- Negotiate contracts that include sustainability clauses.
- Monitor and report supplier performance.

Objective 8.3
Promote social responsibility in supply chains.

Key Result 8.3.1
Partner with 50% of suppliers who demonstrate fair labor practices, diversity, and community impact initiatives by 2030.

Key Result 8.3.2
Partner with 100% of suppliers who demonstrate fair labor practices, diversity, and community impact initiatives by 2050.

Action Plan
- Conduct due diligence on supplier labor practices.
- Provide feedback and support to improve supplier performance.
- Highlight exemplary suppliers in annual reports.

Goal 9: Enhance Biodiversity Conservation and Restoration
Interim Target: 2030 | Net-Zero Target: 2050

Objective 9.1
Protect and Restore Natural Habitats on Campus

Key Result 9.1.1
Increase the number of native plant species on campus by 30% by 2030.

Key Result 9.1.2
Reduce pesticide and herbicide use by 50% compared to 2020 levels by 2030.

Key Result 9.1.3
Establish a fully self-sustaining biodiverse ecosystem on campus that supports at least 500 native plant and animal species by 2050.

Action Plan
- Conduct baseline biodiversity assessments to identify priority areas for restoration.
- Plant native species and create pollinator gardens across campus.
- Implement integrated pest management (IPM) practices to minimize chemical use.
- Develop a long-term maintenance plan for restored habitats.

Objective 9.2
Integrate Biodiversity into Education and Research

Key Result 9.2.1
Develop and offer at least 5 new courses or programs focused on biodiversity, ecosystem services, and sustainable land management by 2030.

Key Result 9.2.2
Publish 10+ peer-reviewed research papers on biodiversity-related topics, including climate adaptation, habitat restoration, and genetic diversity, by 2030.

Key Result 9.2.3
Train 1,000 students annually in biodiversity monitoring, conservation techniques, and citizen science projects by 2030.

Key Result 9.2.4
Position the university as a global leader in biodiversity research, with at least 10 interdisciplinary research centers dedicated to biodiversity conservation by 2050.

Action Plan
- Form a Biodiversity Curriculum Task Force to guide the integration of biodiversity topics into academic programs.
- Launch interdisciplinary research grants focused on biodiversity challenges and solutions.
- Organize workshops, seminars, and field trips to engage students and faculty in biodiversity-related activities.
- Create a repository of biodiversity learning outcomes for faculty use.

Objective 9.3
Promote Community Engagement and Partnerships for Biodiversity

Key Result 9.3.1
Partner with at least 10 local organizations, governments, or businesses to implement biodiversity-focused initiatives in the surrounding region by 2030.

Key Result 9.3.2
Engage 5,000 community members annually in biodiversity awareness campaigns, workshops, and volunteer activities (e.g., tree planting, habitat restoration) by 2030.

Key Result 9.3.3
Support the protection or restoration of 1,000 hectares of natural habitats in collaboration with external partners by 2030.

Key Result 9.3.4
Expand partnerships to include 50+ organizations globally, contributing to large-scale biodiversity conservation efforts by 2050.

Action Plan
- Host annual biodiversity-themed events, such as BioBlitzes, tree-planting drives, and awareness campaigns.
- Collaborate with local NGOs, government agencies, and businesses to implement joint biodiversity projects.
- Provide scholarships and training opportunities for marginalized communities to participate in biodiversity conservation.
- Establish a "Biodiversity Innovation Hub" to facilitate collaboration between academia, industry, and communities.

Objective 4

Monitor Progress and Measure Biodiversity Outcomes

Key Result 4.1

Develop a comprehensive biodiversity monitoring framework for campus and surrounding areas, using technology like remote sensing and AI, by 2030.

Key Result 4.2

Conduct annual biodiversity audits to track species richness, habitat quality, and ecosystem services by 2030.

Key Result 4.3

Establish a real-time biodiversity monitoring system that integrates data from multiple sources (e.g., sensors, citizen science apps, satellite imagery) by 2050.

Action Plan

- Use advanced technologies (e.g., drones, AI, GIS) to monitor biodiversity trends on campus and in surrounding areas.
- Publish an Annual Biodiversity Report detailing progress toward goals, challenges, and lessons learned.
- Set up dashboards to visualize progress toward emission reduction targets and engage stakeholders.
- Share monitoring tools and methodologies with other universities and organizations to promote standardized biodiversity metrics.

6.2 Implementation Framework

1. Governance: Establish a Sustainability Council to oversee implementation.
2. Monitoring and Reporting: Publish an Annual Sustainability Report aligned with GRI Standards and SDG indicators.
3. Stakeholder Engagement: Involve students, faculty, staff, alumni, and external partners in shaping and implementing the strategy.
4. Continuous Improvement: Review and update the strategy every three years to reflect emerging trends and stakeholder feedback.

6.3 Science Base Target Initiative

Axosomatic proposes an effective and structured reduction plan for UJ, 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 below. The baseline year is 2019, and the Interim Target year is 2030.

SBTi Recommended Emissions Reduction Targets												
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Scope 1	3,877.00	3,714.17	3,551.33	3,388.50	3,225.66	3,062.83	2,900.00	2,737.16	2,574.33	2,411.49	2,248.66	2,085.83
Scope 2	8381	5,722	0	0	0	0	0	0	0	0	0	0
Scope 1 + Scope 2	12,258.00	9,436.17	3,551.33	3,388.50	3,225.66	3,062.83	2,900.00	2,737.16	2,574.33	2,411.49	2,248.66	2,085.83
SBTi Target Reduction (Year-on-Year)		4.2%	4.4%	4.6%	4.8%	5.0%	5.3%	5.6%	5.9%	6.3%	6.8%	7.2%

Table 13. Proposed emission reductions based on SBTi and baseline year.

Comments

1. The above table outlines the reduction targets the University of Jordan needs to achieve to reach Net-Zero emissions by 2030 and 2050, based on SBTi guidelines and the 2019 baseline.
2. The University focused on reducing Scope 2 emissions and maintaining the 100% from 2019 to 2024.
3. The SBTi target shall be followed from 2025 onwards.
4. The average annual reduction till 2030 is 5.7%.
5. Though JU has achieved 100% reduction in its Scope 2 emission, Scope 1 emissions are still higher than the SBTi targets.
6. To achieve the required reduction towards Net-Zero, we recommend implementing our proposed reduction strategy.

7. Summary and Recommendations

This report described the Scope 1 and Scope 3 GHG Emissions attributed to the University of Jordan during the performance year from 01 Jan to 31 Dec 2024.

7.1 Key Observations

1. Scope 1 emissions, compared to previous years, included refrigerant leakage.
2. JU managed to reduce its purchased electricity by 100% as of the year 2021.
3. Scope 3 emissions are 56.6% of the total emissions. This is within the range of most organizations. It could be reduced implementing sustainability procurement, and managing waste and water consumption.

7.2 Recommendations

4. Axosomatic recommends considering the replacement of vehicles with hybrid and/or electric vehicles (EVs).
5. Carbon emissions from refrigerant leakage are based on an estimated leakage rate.
    - Axosomatic recommends measuring refrigerant top-up amounts to record actual leakage.
    - Axosomatic suggests that JU implement the strategy outlined in section 6.
6. JU needs to effectively manage its waste and water consumption.
7. We recommend that JU deals with suppliers that are GHG compliant to reduce emissions related to some sources of scope 3.

The University of Jordan has made substantial progress in reducing Scope 2 GHG emissions as of 2021. To achieve further reductions, we recommend following the universal SBTi targets outlined in section 6.3 to align with the 1.5°C global goal, along with the strategic goals. objectives, and key-results outlined in section 6.1.

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ANNEX I: INTRODCUTION TO GHG EMISSIONS[16]

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.

[16] Overview of Greenhouse Gases | US EPA

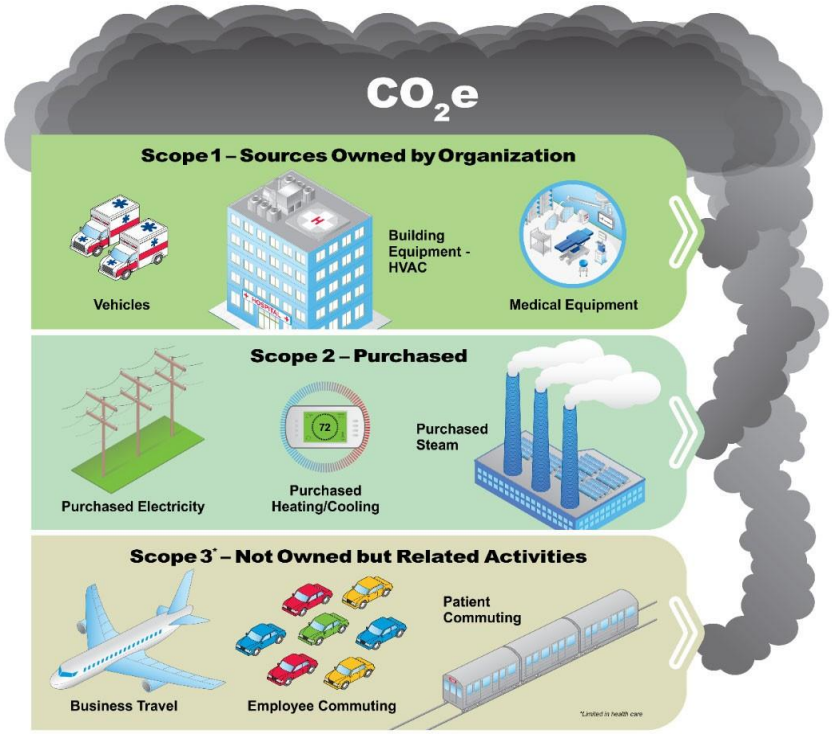

Figure 3.Illustration of CO_2e sources. Source US EPA.

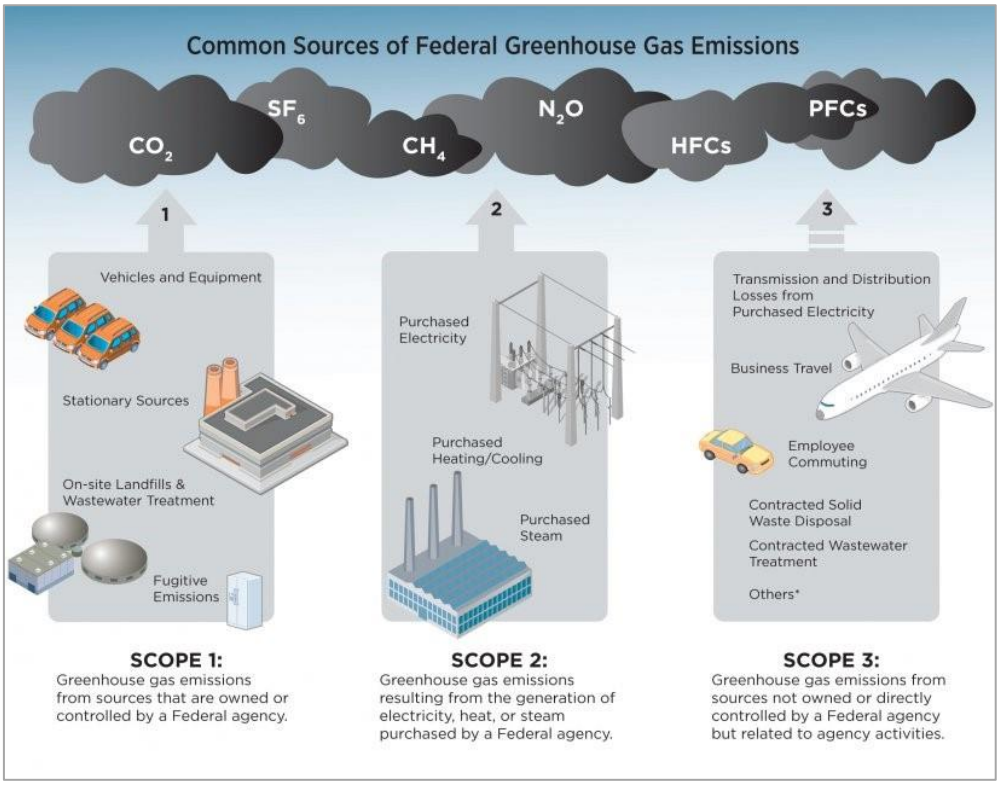

Figure 2. Illustration of sources of GHG gases. Source US EP.

4 Global Warming Potentials[17]

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 14. List of common gases and their GWP 100 years.

[17] https://www.epa.gov

ANNEX II: GLOBAL WARMING 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 Common Name (years)	Chemical Formula	Lifetime (years)	Radiative Efficiency (W m^{-2} ppb^{-1})	Global Warming Potential for Given Time Horizon SAR‡ (100-yr)	20-yr	100-yr	500-yr
Carbon dioxide	CO_2	See below[a]	[b]$1.4x10^{-5}$	1	1	1	1
Methane[c] Nitrous	CH_4	12[c]	$3.7x10^{-4}$	21	72	25	7.6
oxide	N_2O	114	$3.03x10^{-3}$	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 15. GWP 100 years for common gases.