CARBON FOOTPRINT REPORT

2024 – 2025
BASELINE YEAR: 2019

AN-NAJAH NATIONAL UNIVERSITY

Executive Summary

This report presents a comprehensive assessment of greenhouse gas (GHG) emissions at An-Najah National University (ANNU) covering the period 2019–2025, in alignment with the Greenhouse Gas (GHG) Protocol. Emissions are categorized into Scope 1 (direct emissions), Scope 2 (indirect emissions from purchased electricity), and Scope 3 (other indirect emissions across the value chain).

The year 2025 marks a significant institutional milestone in ANNU's decarbonization pathway. Total gross emissions declined to **381.30 tCO_2e**, representing a **93.4% reduction compared to the 2019 baseline (5,774.139 tCO_2e)**. This substantial reduction reflects structural transformation rather than temporary fluctuation.

Most notably:

- **Scope 2 emissions remained at zero**, confirming full reliance on renewable electricity.
- Renewable energy generation reached **3,820,168 kWh**, exceeding total campus electricity demand.
- Scope 1 emissions continued to decline through reduced diesel consumption and improved refrigerant management.
- Scope 3 emissions decreased due to lower commuting intensity, optimized procurement, improved waste management, and increased digital efficiency.

The university now operates as a **net renewable energy producer**, reinforcing its commitment to environmental stewardship, operational efficiency, and climate responsibility.

ANNU remains firmly on track to achieve its **2028 Net Zero target**, supported by measurable reductions, institutional policy integration, and infrastructure modernization.

Methodology

ANNU's carbon emissions calculations adhere to internationally recognized protocols, including the Greenhouse Gas (GHG) Protocol. This assessment considers Scope 1, 2, and 3 emissions, encompassing both direct and indirect emissions from owned or

controlled sources and purchased energy consumption. We ensure accurate emissions quantification by accounting for the carbon intensity of energy sources.

Data Sources

Data for this report is gathered from various university departments and facilities, including energy consumption records, travel data, and procurement activities, ensuring a robust dataset for analysis.

GHG Protocol Scopes

→ Scope 1: emissions produced by fuel combustion on site such as gas boilers, fleet vehicles; by physical or chemical processes and from fugitive emissions such as air-conditioning, refrigeration or pipework leaks.

→ Scope 2: emissions that are due to purchased or acquired electricity, steam, heat and cooling.

→ Scope 3: indirect emissions that derive from activities of the organization from sources that they do not own or control. These are usually the greatest share of the carbon footprint, covering emissions associated with business travel, employee commuting, procurement (i.e. supply chain), leased assets, waste, and water.

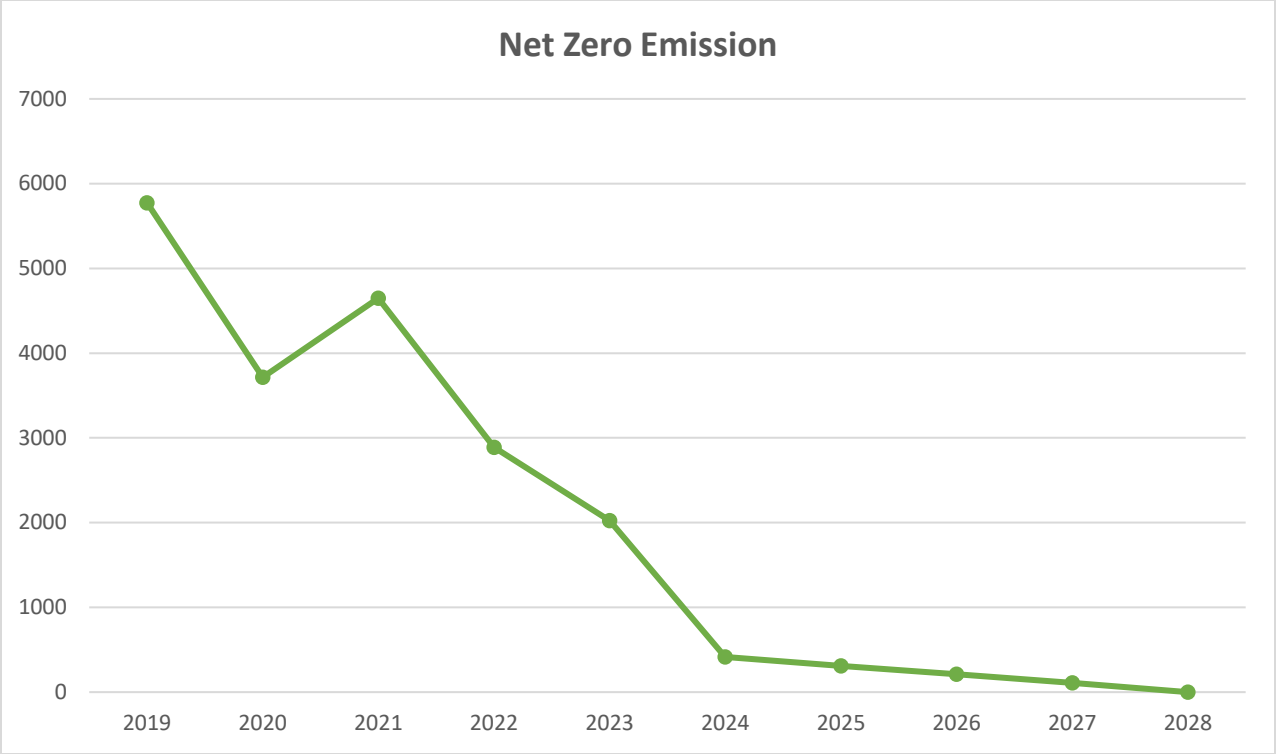
→ Other reporting: emissions which are not included under Scope 1-3 but which the University may opt to report – such as student commuting and relocation.

GHG emissions for ANNU (2019 – 2025)

CO2-e emissions (tons)		Reporting Year						
Associated Inventory/Service		**2019 (Baseline year)**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Scope 1 (tCO2e)	Natural Gas, Transport Fuels, Stationary Fuels, Refrigerants, Waste-Incineration	515.188	266.431	191.939	316.538	288.276	254.33	239.07

Scope 2 (tCO2e)	Purchased Electricity	4970	3353	3290	2275	1470	0	0
Scope 3 (tCO2e)	Equipment, Employee Commute, Flights, Third Party Services, Off-site Waste Disposal, spare, Transmission & Distribution losses, Fuel Extraction, Production & Distribution losses, Other Utilities	288.951	97.079	1164.673	296.405	264.950	162.64	142.23
Gross Total (scope 1 & 2) (tCO2e)		5485.188	3619.431	3481.939	2591.5383	1758.276	254.33	239.07
Gross Total (scope 1, 2 & 3) (tCO2e)		5774.139	3716.51	4646.612	2887.9433	2023.226	416.97	381.30
Energy Consumption (kWh)		7,304,843.4	5,668,451.9	6,556,062.3	5,214,891.7	4,916,629.5	1,572,222	1,600,000
Energy generated through renewable sources (kWh)		173,442.57	868,804.88	1,852,978.6	1,950,354.9	2,829,351.1	3,320,168	3,820,168
Energy Purchased (kWh)		7,131,400.8	4,799,647.0	4,703,083.63	3,264,537.8	2,087,278.4	0	0
Total campus building footprint (m2)		540404.5						

Our Zero Carbon Plan has a 2028 target of net zero emissions and 93.4 percent reduction in gross carbon emissions compared to our 2019 baseline.



GHG Inventory Calculations

Detailed calculations are provided for Scope 1, 2, and 3 emissions, including natural gas, transport fuels, refrigerant gases, purchased electricity, business travel, commuting, procurement, waste disposal, and ICT equipment.

Scope 1 – Direct GHG Emissions

1 - Natural Gas

As part of our ongoing commitment to monitor and mitigate greenhouse gas (GHG) emissions, ANNU transparently documents the use of natural gas, a significant contributor to our overall emissions profile. This report specifically addresses the direct emissions (Scope 1) stemming from our on-site utilization of natural gas, with calculations based on data from the base year 2019.

Year	Natural Gas Consumption (kg)	Estimated GHG Emissions (kg CO2)	Estimated GHG emissions (tCO2e)
2019	339	339 kg * 3.01 kg CO2/kg = 1020.39 kg CO2	1.02039

2020	98	98 kg * 3.01 kg CO2/kg = 294.98 kg CO2	0.29498
2021	485	485 kg * 3.01 kg CO2/kg = 1459.85 kg CO2	1.45985
2022	438	438 kg * 3.01 kg CO2/kg = 1318.38 kg CO2	1.31838
2023	484	484 kg * 3.01 kg CO2/kg = 1456.84 kg CO2	1.45684
2024	412	412 kg * 3.01 kg CO2/kg = 1240.12 kg CO2	1.24012
2025	395	395 kg * 3.01 kg CO2/kg = 1.189kg CO2	1.18900

2 - Fuels (Diesel Consumption)

Our operations involve the use of a variety of transport & non-transport fuels, including those used for generators, boilers, maintenance equipment, and other campuses operations. The GHG emissions from non-transport diesel fuel can be calculated using the emission factor for diesel fuel. According to the United States Environmental Protection Agency (EPA), the emissions factor for diesel fuel is approximately 2.688 kg CO2/litre when combusted.

Year	Diesel Consumption (litres)	Estimated GHG Emissions (kg CO2)	Estimated GHG emissions (tCO2e)
2019	183250	492576	492.576
2020	97670	262536.96	262.536
2021	60000	161280	161.280
2022	108080	290520	290.520
2023	92919	260520	260.520
2024	85123	228810	228.810

2025	80,000	215040	215.04

3 - Refrigerant Gases

Emissions from leakage of refrigerants from cooling equipment were also part of our inventory. These were calculated using the total amount of each type of refrigerant refilled during the year, the associated global warming potential (GWP), and the specific leakage rate. The total emissions from refrigerant gases were approximately 22.84 metric tons of CO2 equivalent in 2025.

Refrigerant gases are used in a variety of applications at ANNU, including air conditioning in buildings and vehicles, refrigeration in kitchens, and various laboratory equipment. Since these gases have high global warming potentials (GWPs), they contribute to the University's greenhouse gas (GHG) emissions. In this section, we will calculate the GHG emissions associated with the use of these refrigerant gases from 2019 through 2025.

2019:

- Refrigerators (R134a): 2 kg, Emissions = 2 kg * 1430 GWP = 2.8 tCO2e
- Air Conditioning (R410a): 9 kg, Emissions = 9 kg * 2088 GWP = 18.792 tCO2e

2020:

- Refrigerators (R134a): 0.85 kg, Emissions = 0.85 kg * 1430 GWP = 1.2 tCO2e
- Air Conditioning (R410a): 1.15 kg, Emissions = 1.15 kg * 2088 GWP = 2.4 tCO2e

2021:

- Refrigerators (R134a): 3 kg, Emissions = 3 kg * 1430 GWP = 4.2 tCO2e
- Air Conditioning (R410a): 12 kg, Emissions = 12 kg * 2088 GWP = 25 tCO2e

2022:

- Refrigerators (R134a): 2 kg, Emissions = 2 kg * 1430 GWP = 2.8 tCO2e

- Air Conditioning (R410a): 10.5 kg, Emissions = 10.5 kg * 2088 GWP = 21.9 tCO2e

2023:

- Refrigerators (R134a): 2.6 kg, Emissions = 2.6 kg * 1430 GWP = 3.8 tCO2e
- Air Conditioning (R410a): 10.7 kg, Emissions = 10.7 kg * 2088 GWP = 22.5 tCO2e

2024:

- Refrigerators (R134a): 2.3 kg, Emissions = 2.3 kg * 1430 GWP = 3.2 tCO2e
- Air Conditioning (R410a): 10.1 kg, Emissions = 10.1 kg * 2088 GWP = 21.08 tCO2e

2025:

- Refrigerators (R134a): 2.1 kg, Emissions = 2.1 kg * 1430 GWP = 3.003 tCO2e
- Air Conditioning (R410a): 9.5 kg, Emissions = 9.5 kg * 2088 GWP = 19.836 tCO2e

Year	Refrigerators (R134a) emissions (tCO2e)	Air Conditioning (R410a) emissions (tCO2e)	Total GHG emissions from refrigerant gases (tCO2e)
2019	2.8	18.792	21.5
2020	1.2	2.4	3.6
2021	4.2	25	29.2
2022	2.8	21.9	24.7
2023	3.8	22.5	26.3
2024	3.2	21.08	24.28
2025	3.0	19.8	22.84

Scope 2 – Energy Indirect GHG Emissions

Baseline Year:

The baseline year for our calculations is 2019, providing a benchmark to assess the university's operations before significant energy conservation and sustainability initiatives were implemented.

Methodology:

To determine the GHG emissions associated with our electricity consumption, we utilized average emissions factors provided by the International Energy Agency (IEA). Specifically, for electricity generated from diesel power plants in non-OECD countries, the emissions factor is approximately 0.7 kg of CO2 per kilowatt-hour (kWh) consumed.

We gathered total electricity consumption data from ANNU's electricity invoices for each relevant year. By multiplying the energy consumed (in kWh) by the emissions factor (in kg CO2/kWh), we estimated the CO2 emissions for that year using the following calculation formula:

CO2 emissions (kg) = Electricity consumption (kWh) x Emission factor (kg CO2/kWh)

Year	Electricity Purchased (million kWh)	Estimated GHG Emissions (thousand tCO2e)
2019	7.10	4.970
2020	4.79	3.353
2021	4.70	3.290
2022	3.25	2.275
2023	2.10	1.470
2024	0	0
2025	0	0

Electricity Consumption = Electricity Purchased + Electricity used by RES

Year	Electricity Consumption (million kWh)
2019	7.3
2020	5.6
2021	6.5
2022	5.2

2023	3.2
2024	1.5
2025	1.6

Scope 3 – Other Indirect GHG Emissions

1- Business Travel

Business travel encompasses various modes of transportation such as air, rail, personal car, rental car, and bus. Data for business travel was gathered from invoices and travel logs. GHG emissions are computed based on the distance traveled, type of vehicle, and specific emission factors associated with each mode of transport.

Calculation Methodology:

GHG emissions were determined by multiplying the total distance traveled (in kilometers) by an average emission factor of 2.68 kg CO2e per liter and assuming an average fuel efficiency of 10 kilometers per liter (km/L).

Year	Estimated Trips	Average Distance per Trip (km)	Total Distance (km)	GHG Emissions (tCO2e)
2019	130	102	13260	3.553
2020	30	50	1500	0.402
2021	50	180	9000	2.412
2022	140	350	49000	13.13
2023	120	150	18000	4.824
2024	108	143	15444	4.138
2025	100	130	13,000	3.484

2 - Student and Staff Commuting

Student and staff commuting refers to transportation to and from the university. Data for commuting was obtained from surveys and university records. GHG emissions are

computed based on the distance traveled, mode of transport, and specific emission factors.

Calculation Methodology:

GHG emissions were determined by multiplying the total distance traveled (in kilometers) by an average emission factor of 2.68 kg CO2e per liter (kg CO2e/L) and assuming an average fuel efficiency of 10 kilometers per liter (km/L).

Year	Estimated Commuters	Average Distance per Day (km)	Total Distance (km)	GHG Emissions (tCO2e)
2019	8709	20	174180	46.68
2020	400	20	8000	2.144
2021	600	20	12000	3.216
2022	7000	20	140000	37.52
2023	5500	20	110000	29.48
2024	2500	20	50000	13.400
2025	2000	20	40,000	10.75

3 - Purchased Goods and Services

This category encompasses various purchases such as paper, printing, and other goods and services. Data for these purchases was collected from invoices and purchasing records.

Calculation Methodology:

For each $1,000 spent, it is assumed to result in approximately 0.4 metric tons of CO2 equivalent (tCO2e), based on a rough global average according to the World Resources Institute (WRI).

Year	Total Expenditure ($)	GHG Emissions (tCO2e)
2019	70632.34	28.252
2020	31984.47	12.793
2021	36526.31	14.610
2022	79840.59	31.936

2023	58257.38	23.302
2024	43134.34	17.253
2025	35000.00	14.000

4 - Waste Disposal

Waste disposal encompasses solid waste and wastewater. Data for waste disposal was gathered from waste management facilities and invoices. Emissions are computed based on the type of waste and specific emission factors.

Calculation Methodology:

The emissions from waste disposal vary depending on the type of waste and the disposal method. For simplicity, an average emission factor of 1.5 kg CO2e per kilogram (kg) of waste is utilized, based on data from the World Resources Institute (WRI).

Year	**Total Waste (kg)**	**GHG Emissions (tCO2e)**
2019	77,800	116.7
2020	32,200	48.3
2021	41,000	61.5
2022	56,000	84.0
2023	64,800	97.2
2024	44,654	66.9
2025	38,000	57.0

5 - ICT Equipment

Data regarding ICT equipment was gathered from records maintained by the university.

Calculation Methodology:

GHG emissions associated with ICT equipment were computed by multiplying the energy consumed (measured in kilowatt-hours, kWh) by an emission factor of 0.475 kilograms of CO2 equivalent per kilowatt-hour (kg CO2e/kWh).

Year	Number of Devices	Energy Consumption (kWh)	GHG Emissions (tCO2e)
2019	658	197,400	93.765
2020	704	70,400	33.440
2021	582	174,600	82.935
2022	911	273,300	129.817
2023	773	231,900	110.152
2024	654	196.2	60.949
2025	600	120.000	57.000

Monthly Scope 1 and 2 estates-based emissions - 2024 – 2025 (Financial Year)

Month	CO2-e emissions (tons)
Sep	24.3
Oct	24.0
Nov	23.7
Dec	23.4
Jan	23.0
Feb	22.8
March	22.5
April	22.2
May	21.8
June	21.5
July	11.5
Aug	11.2

Monthly Scope 3 estates-based emissions - 2024-2025 (Financial Year)

Month	CO2-e emissions (tons)
Sep	10.9
Oct	16.4

Nov	14.6
Dec	16.4
Jan	21.8
Feb	18.2
March	14.6
April	12.8
May	10.9
June	5.5
July	5.5
Aug	5.5

Total University Campuses buildings footprint

We have calculated the Gross Internal Area (GIA) of the university's buildings, we measured the floor area of each level within the external walls and then sum them up.

- Measure Each Floor Area: Measure the floor area of each level within the external walls of the building. This includes all usable space, such as rooms, corridors, and common areas. Ensure you measure up to the internal face of the external walls.
- Exclude Non-Enclosed Areas: Exclude areas like balconies, porches, and external stairs from your measurements. Only include the internal space enclosed by the external walls.
- Sum Up the Areas: Add up the floor areas of all levels to get the total Gross Internal Area (GIA) of the building.

Campus	**Buildings name**	**Gross internal area (m2)**
Old campus	Administration Building	3590
	Deanship of Student Affairs Building	4364
	Old campus library Building	5630
	Faculty of Humanities & Faculty of Economics and Social Studies Building	11874.4
	Faculty of Educational Sciences and Teachers' Training Building	6877.6
	Faculty of Islamic Law Building	3436.5

	Zafer Al-Masri Amphitheaters Building	2744
		38516.5
New campus	Faculty of Engineering and Information Technology Building	78975
	Faculty of Science Building	110400
	Medicine faculty Building	30000
	Faculty of Fine Arts Building	32000
	Faculty of sport Building	22800
	New campus library Building	29600
	Korean Palestinian IT Institute of excellence Building	11001
	Scientific center Building	36000
	Faculty of Law Building	45672
	An-Najah Child institute Building	12500
	Faculty of Optical & nursing college Buildings	46320
		455268
Hijawi Campus	Hisham Hijawi	37500
Tulkarem Campus	Agriculture Faculty	9120
Total campus building footprint **(m2)**		**540404.5**

Summary

The 2025 reporting year confirms that An-Najah National University has transitioned from incremental carbon reduction to systemic decarbonization. Achieving a 93.4% reduction in total emissions relative to the 2019 baseline demonstrates that institutional climate commitments have translated into measurable performance outcomes.

The elimination of Scope 2 emissions through complete renewable electricity coverage represents a structural shift in campus energy governance. Simultaneously, continued reductions in Scope 1 and Scope 3 emissions indicate progress in fleet efficiency, refrigerant control, commuting behavior, procurement practices, waste diversion, and digital optimization.

With total emissions reduced to 381.30 tCO_2e and renewable generation exceeding demand, ANNU has established a stable low-carbon operating model. The remaining emissions footprint is increasingly concentrated in value-chain activities, which will be the focus of future reduction strategies including electrification, behavioral interventions, supply chain engagement, and carbon-neutral mobility solutions.

As the university advances toward its 2028 Net Zero target, the 2025 results confirm that ANNU is not only compliant with international GHG accounting standards but is also positioned as a regional leader in higher education sustainability and climate action.