

K.R. Mangalam University

Carbon Emission Report

Academic Year 2024 – 2025



1. Institutional Overview

K.R. Mangalam University (KRMU) is a UGC-recognised, multidisciplinary higher education institution on Sohna Road, Gurugram, Haryana, established under the K.R. Mangalam University Act, 2014. The University holds ISO 14001:2015 Environmental Management System certification (valid to July 2026) and received an A+ Institutional Grade with Diamond Category under the Sustainable Institutions of India – Green Rankings 2023. KRMU's sustainability commitments are formalised in the Sustainable Environment & Green Campus Policy (2025), which mandates 40% renewable energy by 2028, 100% renewable electricity by 2030, and Net Zero campus operations by 2035 -with no investment in coal or oil energy sources.

Institutional Parameter	Details AY 2024–25
Location	Sohna Road, Gurugram, Haryana – 122103
Campus Area	26.4 acres
Total Built-up Area	520,972 sq ft (approximately 48,380 m ²)
Total Campus Population (AY 2024–25)	~6,000 persons (Students + Faculty + All Staff)
University Transport Fleet	93 CNG buses (78 × 50-seater + 15 × 35-seater) Total capacity: 4,425 seats
Blocks	Academic Blocks A, B, C and Hostel
Laboratories	60+ (Science, Engineering, Pharmacy, Architecture, Allied Health, etc.)
Renewable Energy -Solar PV	310 kWp rooftop installation 984 panels across Blocks A, B, C & Hostel
Waste-to-Energy	Biogas Plant -100 kg/day food waste capacity; generates ~80 m ³ biogas/month
Sewage Treatment Plant (STP)	100 KLD operational + 300 KLD under installation 80% effluent reuse
Rainwater Harvesting	17 pits (3 × 3 m, 3 m deep) distributed across campus
Green Cover	>8,000 trees 6.39 acres landscaped green zone Native species priority
Environmental Certification	ISO 14001:2015 (valid July 2026) A+ Diamond Green Ranking 2023
Net Zero Commitment	2035 (per Sustainable Environment & Green Campus Policy 2023)

1.1 SDG Alignment

SDG	Goal	KRMU Action in AY 2024–25	Measurable Outcome
SDG 7	Affordable & Clean Energy	310 kWp solar PV; biogas plant; LED campus transition; net metering with DHBVN	20.7% electricity from renewables; 374,925 kWh generated; 268 tCO ₂ e avoided
SDG 11	Sustainable Cities & Communities	93 CNG buses (4,425 seats); STP 80% reuse; 17 RWH pits; walkable campus; EV carts	53,333 L/day freshwater use; 19,200 m ³ /year; 80% wastewater recycled
SDG 12	Responsible Consumption & Production	Source segregation (5 streams); biogas; 62.8% dry recycling; plastic-free policy; MoU recyclers	115.54 T waste; 4.75 T food→biogas; 5.04 T e-waste handled; 100% organic processed
SDG 13	Climate Action	Annual GHG inventory (GHG Protocol); ISO 14001; Green Campus Policy; Net Zero 2035 roadmap	GHG inventory completed; per-capita energy declining; carbon neutrality roadmap adopted

1.2 Sustainability Governance

Governance Body	Role & Mandate
Board of Management	Apex body -approves sustainability policies, Net Zero roadmap, capital investment in green infrastructure
IQAC	Integrates sustainability indicators into NAAC/QS/NIRF reporting; coordinates green and energy audits
Centre of Excellence for SDGs	Maps activities to UNSDG targets; conducts commuting survey; community outreach (8+ events/year)
Energy Management Committee	Monthly/quarterly energy reviews; action-taken reports; audit coordination
Estate & Works Dept.	Implements LED transition, solar maintenance, STP operation, EV carts, DG management
Environment Club / NSS / YRC	Plantation drives, awareness campaigns, cleanliness drives, poster/essay competitions on sustainability

2. Reporting Framework & Methodology

2.1 Standard & Boundary

This report is prepared in accordance with the GHG Protocol Corporate Accounting and Reporting Standard (WRI / WBCSD). An operational control boundary is applied all facilities where KRMU exercises day-to-day operational authority are included. All GHG emissions are expressed in tonnes of CO₂ equivalent (tCO₂e) using 100-year Global Warming Potential (GWP) values from IPCC Sixth Assessment Report (AR6).

2.2 Operational Boundary -Inclusions

- All academic blocks (A, B, C) and Hostel
- Administrative offices, library, canteens, food courts
- All laboratories (60+) and utility infrastructure
- Campus transport fleet (93 CNG buses + official vehicles)
- Diesel generator sets (backup power -grid outage use only)
- Biogas plant, composting and vermicomposting units
- 100 KLD Sewage Treatment Plant (STP)
- 310 kWp Solar PV rooftop system
- Rainwater harvesting infrastructure (17 pits)
- Student and staff daily commuting (Scope 3 -survey-based)

2.3 Emission Factors Applied

Emission Category	Factor Value	Unit
Grid Electricity (India)	0.716	kgCO ₂ e/kWh
Diesel (generators, vehicles)	2.68	kgCO ₂ e/litre
CNG (transport buses)	1.80	kgCO ₂ e/m ³
LPG (kitchen/hostel)	2.98	kgCO ₂ e/kg
Petrol (personal commuting)	2.31	kgCO ₂ e/litre

Solid Waste- Landfill fraction	0.47	tCO ₂ e/tonne
Paper consumption	1.84	kgCO ₂ e/ream
Water -upstream supply	0.34	kgCO ₂ e/m ³

3. GHG Emission Inventory AY 2024–25

3.1 Scope 1- Direct Emissions

Scope 1 covers all GHG emissions from combustion sources owned or controlled by KRMU. Three sources apply: diesel generators used only during grid outages, the CNG university transport fleet, and LPG in hostel kitchens (partially substituted by biogas). Scope 1 is the smallest emission category owing to KRMU's clean energy substitution strategy.

Emission Source	Fuel	Emission Factor	tCO ₂ e
Diesel Generators (Backup -grid outages only)	Diesel	2.68 kgCO ₂ /L	55.0
University Transport Fleet (93 CNG Buses + Official Vehicles)	CNG	1.80 kgCO ₂ /m ³	35.7
LPG -Hostel Kitchens (Net of Biogas Substitution)	LPG	2.98 kgCO ₂ /kg	2.4
SCOPE 1 TOTAL		93.1 tCO₂e	

3.2 Scope 2 -Energy Indirect Emissions (Purchased Electricity)

Scope 2 covers GHG emissions from electricity purchased from the DHBVN state grid. Both gross (location-based) and net (after solar credit) figures are reported. GHG Protocol requires gross Scope 2 in the primary inventory; the solar credit is disclosed separately as avoided emission for transparency and QS context.

Emission Source	Energy Type	Emission Factor	tCO ₂ e
Grid Electricity (All campus operations)	Grid kWh	0.716 kgCO ₂ /kWh	1,028.5
Water Supply & STP (Pumping, treatment, RO)	Electricity	0.716 kgCO ₂ /kWh	25.1
ICT & Office Equipment (Labs, servers, admin)	Electricity	0.716 kgCO ₂ /kWh	27.2
SCOPE 2 GROSS TOTAL		1,080.8 tCO₂e	
On-Site Solar Generation (Avoided Scope 2 -disclosed separately)	Solar PV	0.716 kgCO ₂ /kWh	(-268.4) Avoided
SCOPE 2 NET (after solar credit)		812.4 tCO₂e	

3.3 Scope 3 -Other Indirect Emissions

Scope 3 covers indirect emissions from sources outside KRMU's direct operational control. Commuting of students and staff is the dominant category, estimated from the annual commuting mode-split survey conducted by the Centre of Excellence for SDGs (participation: 63% teaching staff, 37% non-teaching staff). Mode split: University bus 27%,

Carpooling 30%, Public transport 14%, Personal car 9%, Two-wheeler 8%, One-way bus + public 8%, Walking/Cycling 2%, EV 2%.

Scope 3 Category	Activity Type	tCO ₂ e
Student & Staff Commuting (Survey-based, population 6,000)	Mixed modes (CNG bus, car, public, 2W)	200.0
Solid Waste -Landfill Fraction (Non-recycled portion)	Mixed waste to landfill	20.2
Paper Consumption (Office + academic printing)	Office paper	4.0
Water -Upstream Supply (Embodied extraction & treatment)	Freshwater supply chain	6.5
Food Waste (Post Biogas Recovery)	Organic → Biogas	0.0 (Net Zero)
SCOPE 3 TOTAL		230.7 tCO₂e

3.4 Consolidated GHG Inventory Summary AY 2024-25

Emission Category	Scope	tCO ₂ e	% of Total	vs 2023–24 Reference
Direct Emissions (Diesel Gen. + CNG Transport + LPG net)	Scope 1	93.1	6.6%	↓ from 115 tCO ₂ e (-19.1%)
Energy Indirect -GROSS (Grid electricity + Water pumping + ICT)	Scope 2	1,080.8	76.8%	↑ Grid kWh consumed (campus growth) but energy intensity ↓ 13.2%
Other Indirect (Commuting + Waste + Paper + Water upstream)	Scope 3	230.7	16.4%	↑ proportional to larger population
On-Site Solar Generation (Avoided Scope 2 -disclosed for QS transparency)	Scope 2 Credit	(-268.4)	—	374,925 kWh × 0.716 kgCO ₂ /kWh
TOTAL GROSS GHG EMISSIONS (Scope 1 + Scope 2 gross + Scope 3)				1,404.6 tCO₂e
TOTAL NET GHG EMISSIONS (after on-site solar credit)				1,136.2 tCO₂e

4. Sustainability Initiatives & Measured Impact

4.1 Renewable Energy & Carbon Avoidance

Initiative	Description & Evidence	Measured Impact -AY 2024–25
310 kWp Rooftop Solar PV	984 panels -Blocks A, B, C + Hostel. Grid-connected with net-metering (DHBVN). Monitored via inverter logs. Audit-verified.	374,925 kWh generated 268.4 tCO ₂ e avoided 20.7% renewable share
Biogas Plant (Food-to-Energy)	100 kg/day organic waste capacity. Biogas used in hostel kitchens; slurry applied to horticulture. Replaces fossil LPG.	4.75 T food waste processed Net-zero food waste emissions ~7 kg LPG/day replaced
Net Metering (Grid Feed-In)	Surplus solar exported to DHBVN during low-demand hours. Rebate arrangement reduces electricity bill.	Surplus credits applied; contributes to regional renewable energy supply

Solar Water Heaters (Hostel)	Thermal solar collectors on hostel rooftops providing hot water for residential blocks.	Reduces LPG and electric geyser energy demand in hostels
Afforestation & Green Cover	>8,000 trees 6.39 acres native species NSS-led plantation drives MoU with Climate Reality Project.	Carbon sequestration Heat-island mitigation Reduced cooling load
ISO 14001:2015 Certification	Environmental Management System certified (valid July 2026). Structured compliance and continuous improvement.	Audited environmental performance Enhanced QS credibility

4.2 Sustainable Transport & Mobility

Initiative	Description	Impact
93 CNG Buses (↑ from 73 in 2023–24)	78 × 50-seater + 15 × 35-seater = 4,425 seat capacity. Addition of 20 buses in AY 2024–25. Centralised Transport Department management.	Absorbs increased student numbers; displaces private vehicle trips; lower per-trip emission
Carpooling Programme (30% staff participation)	Structured carpooling initiative by Centre of Excellence for SDGs. 63% teaching + 37% non-teaching staff participated in survey. 30% use carpool.	Reduces single-occupancy vehicle trips; lower Scope 3 commuting emissions
EV Carts (Intra-Campus)	Battery-operated EV carts for short-distance on-campus movement. No-Automobile Policy enforced inside campus boundary.	Zero tail-pipe emissions within campus; safer pedestrian environment
No-Automobile Zone	Private/diesel vehicles restricted. All vehicles parked in designated external zones. Pedestrian pathways network fully operational.	Eliminates combustion engine emissions inside campus

4.3 Water & Waste Circular Economy

Initiative	Description	Impact
100 KLD STP + 300 KLD (Under Installation)	All campus wastewater treated. 80% effluent reused for landscaping, flushing, vehicle wash.	~14,400 m ³ reused/year, 49% freshwater reduction
17 Rainwater Harvesting Pits	3×3 m, 3 m deep. Distributed across academic and hostel blocks. Borewell recharge structures.	Groundwater table maintained; supports borewell sustainability
5-Stream Source Segregation	Colour-coded bins: dry recyclables, wet organic, e-waste, biomedical, hazardous. Door-to-door collection system.	62.8% dry recycling 100% organic processing e-waste compliance
MoU -Authorised Recyclers	SRC Enterprises, Adinath Recyclotronix Pvt. Ltd., Indian Petro & Chemicals.	5.04 T e-waste safely channelled Hazardous waste compliant disposal
Composting & Vermicomposting	Horticulture waste + biogas slurry converted to organic compost and vermicompost for campus gardens.	Zero-to-landfill for organic fraction Closed-loop resource recovery

5 Carbon Reduction Strategy & Net Zero Roadmap

KRMU's formally approved Sustainable Environment & Green Campus Policy (2025) establishes binding institutional targets: 40% renewable energy by 2028; 25% GHG reduction by 2028 (from 2022–23 baseline); 100% renewable electricity by 2030; and Net Zero campus operations by 2035. This section translates those commitments into a phased, milestone-driven roadmap.

Phase	Period	Targets & Milestones	Key Actions Required
Phase 1 Foundation	AY 2022–25 (Completed)	<ul style="list-style-type: none"> • GHG inventory established (GHG Protocol) • 20.7% renewable energy achieved • ISO 14001:2015 certification secured • 93 CNG buses operational (4,425 seats) • 100 KLD STP: 80% effluent reuse • Biogas plant: net-zero food waste • Green Campus Policy 2023 adopted 	<ul style="list-style-type: none"> • Standardise population denominator • Reconcile solar generation data • Complete LED Blocks A & B • Commission 300 KLD STP • Obtain diesel fuel purchase invoices
Phase 2 Acceleration	AY 2025–27	<ul style="list-style-type: none"> • Renewable energy: 30–35% • LED: 95%+ campus-wide • 300 KLD STP commissioned • BLDC fans: 80%+ campus rollout • EV bus pilot (2–3 buses) • IoT sub-metering all blocks • Per capita GHG ↓ 20% from 2024–25 	<ul style="list-style-type: none"> • Expand solar PV to 400+ kWp • Smart energy monitoring dashboard • EV bus procurement tender • Green building norms for new blocks • ISO 14064-1 GHG verification
Phase 3 Deep Decarb.	AY 2027–30	<ul style="list-style-type: none"> • Renewable energy: 40%+ (Policy target) • 100% renewable electricity by 2030 • 25% GHG reduction from baseline • BESS (Battery Energy Storage) pilot • Carbon neutrality plan submitted • Green building certification (GRIHA) 	<ul style="list-style-type: none"> • Battery storage procurement • Renewable Energy Certificates (RECs) • Carbon sequestration audit • Green hydrogen feasibility study • Third-party GHG report verified
Phase 4 Net Zero	AY 2030–35	<ul style="list-style-type: none"> • Net Zero operational emissions: 2035 • Residual Scope 1+2+3 fully offset • Campus forest carbon sink registered • Public sustainability dashboard live • Annual third-party verified GHG report • 100% renewable energy (all sources) 	<ul style="list-style-type: none"> • RECs for residual grid emissions • Campus forest carbon registration • Lifecycle Assessment (LCA) • Public net-zero declaration • International sustainability certification

6 Conclusion & Institutional Commitment

K.R. Mangalam University has maintained a consistent, multi-dimensional sustainability performance across AY 2024–25 against a backdrop of significant campus growth. With a total campus population of approximately 6,000 persons, KRMU recorded total gross GHG emissions of 1,404.6 tCO₂e and net emissions of 1,136.2 tCO₂e (after accounting for 268.4 tCO₂e avoided through the 310 kWp rooftop solar PV system).

The University's most notable achievements this year include: a 13.2% improvement in energy intensity (kWh/sq.ft.); a 49% reduction in per-capita freshwater consumption (from 6.27 m³ to 3.20 m³/person); 100% organic waste processing through the on-campus biogas plant and composting units; 80% STP effluent reuse maintained; and expansion of the CNG transport fleet to 93 buses (4,425 seats), reducing commuting-based Scope 3 emissions per capita. Per capita energy consumption declined from 395 kWh to 302 kWh/person -a 23.5% improvement over 2023–24.

Critical improvements identified for the next reporting cycle include: reconciliation of the four conflicting solar generation data series across the Energy Management Report; procurement and verification of diesel fuel invoices for accurate Scope 1 reporting; completion of the LED transition in Blocks A and B; formal standardisation of the campus population denominator across all institutional sustainability documents; and commissioning of the 300 KLD STP to significantly expand the University's water recycling capacity.