



Carbon Footprint Report 2025



PREPARED BY
Sakshi Chandel
Sustainability Manager
Chitkara University

INDEX

S. No.	Subject	Page No.
1.	Summary	2
2.	Scope of the report	4
3.	Global warming potentials	4
4.	Scope 1	6
5.	Scope 2	11
6.	Scope 3	13
7.	Conclusion	19
8.	Carbon reduction plan for Chitkara University	20

CARBON FOOTPRINT REPORT

1. Summary

In addition to emphasizing areas of progress over the previous year, the carbon footprint assessment for Chitkara University in Punjab offers a thorough study of greenhouse gas emissions for the academic year.

Scope 1 (Direct Emissions):

- Fuel Combustion in Company Vehicles (Transportation): 115.1 tCO_{2e}
- Stationary Emissions: 108.243 tCO₂
- Fugitive Emissions (Refrigerants): 354.71tCO_{2e}

Total Scope 1 Emissions: 578.053 tCO_{2e}

Scope 2 (Indirect Emissions from Purchased Electricity):

- Electricity from Grid: 1.88 tCO_{2e}

Indirect emissions from energy consumption amounted to 1.88 tCO_{2e}, sourced from grid electricity. This represents a significant increase from the previous year, attributed to the rise in energy consumption driven by the university's continued growth and development.

Total Scope 2 emissions: 1.88 tCO_{2e}

Scope 3 (Other Indirect Emissions):

- Business Air Travel: 213.125 tCO₂e
- Employee Commuting: 451.05 tCO₂e
- Purchased Goods and Services: 8.318 tCO₂e

Total Scope 3 Emissions: 672.493 tCO₂e

Total Emissions for the current year are 1252.426 tCO₂e, a significant reduction from **1,383.60 tCO₂e** in 2023-24. The previous year's emissions included:

- Scope 1: 600.26 tCO₂e
- Scope 2: 1.86 tCO₂e
- Scope 3: 781.48 tCO₂e

2. Scope of the report

The scope of this report is to present Chitkara University's carbon emissions for academic year 2024-25. It explores the campus response to climate change up to 30 June 2025 and the formation of the Climate action plan. Introduces the plans for the new climate action team to take this agenda forward, building on past success.

3. Global Warming potentials

The following table includes the 100-year time horizon of global warming potentials (GWP) relative to CO₂. This table is adapted from the IPCC Fifth Assessment Report, 2014 (AR5).

Industrial designation or common name	Chemical formula	GWP values for 100- year time horizon as per fifth assessment report (AR5), 2014
Carbon dioxide	CO ₂	1
Methane	CH ₄	28
Nitrous oxide	N ₂ O	265
Sulfur hexafluoride	SF ₆	23,500
Nitrogen trifluoride	NF ₃	16,100
HFC-23	CHF ₃	12400
HFC-32	CH ₂ F ₂	677
HFC-41	CH ₃ F	116
HFC-125	C ₂ HF ₅	3170
HFC-134	CHF ₂ CHF ₂	1120
HFC-134a	C ₂ H ₂ F ₄	1300
HFC-143	CH ₂ FCHF ₂	328
HFC-143a	C ₂ H ₃ F ₃	4800
HFC-152	CH ₂ FCH ₂ F	16
HFC-152a	C ₂ H ₄ F ₂	138

HFC-161	CH ₃ CH ₂ F	4
HFC-227ea	C ₃ H ₇ F	3350
HFC-236cb	CH ₂ FCF ₂ CF ₃	1210
HFC-236ea	CHF ₂ CHFCF ₃	1330
HFC-236fa	C ₃ H ₂ F ₆	8060
HFC-245ca	CH ₂ FCF ₂ CHF ₂	716
HFC-245fa	CHF ₂ CH ₂ CF ₃	858
HFC-365mfc	CH ₃ CF ₂ CH ₂ CF ₃	804
HFC-43-10mee	CF ₃ CHFCHFCF ₂ CF ₃	1650
PFC-14	CF ₄	6630
PFC-116	C ₂ F ₆	11,100
PFC-218	C ₃ F ₈	8900
PFC-318	c-C ₄ F ₈	9540
PFC-31-10	C ₄ F ₁₀	9200
PFC-41-12	C ₅ F ₁₂	8550
PFC-51-14	C ₆ F ₁₄	7910
PFC-91-18	C ₁₀ F ₁₈	7190
HCFC-22 CHCLF ₂	HCFC-22 CHCLF ₂	1760

Scope 1

Scope 1: Direct greenhouse gas emissions from sources under the organization's ownership or control are referred to as scope 1 emissions. These emissions come from stationary sources like boilers and generators, fugitive emissions from air conditioning and refrigeration systems, and activities like fuel combustion in company-owned vehicles. Since scope 1 emissions come from activities that are directly within the organization's control, they are usually the simplest to detect and quantify. One of the most important steps in lowering an organization's overall carbon footprint is managing and lowering Scope 1 emissions.

1. Fuel combustion in company vehicles

When fuels burn in mobile sources, the greenhouse gases CO₂, CH₄, and N₂O are released. Emissions of CH₄ and N₂O together make up just about 1% of total transportation-related greenhouse gas emissions for most modes of transportation.

CATEGORIES OF MOBILE SOURCES	
Total Categories	Mobile source categories applicable to Chitkara University
On road vehicles - Passenger cars - Vans, pickup trucks and SUVs - Heavy-duty vehicles - Combination trucks - Buses	Yes Yes Yes

Non road vehicles - Construction equipment - Agricultural equipment - Forklifts - Other nonroad equipment	Yes
Waterborne - Ships - Boats	No
Rail - Freight trains - Commuter rail - Amtrak	No
Air - Commercial aircraft - Executive jets	No

The data reflects the carbon emissions resulting from fuel consumption by the university's vehicles. Two types of fuel were utilized: diesel and petrol. Diesel-powered vehicles consumed 39,881 liters, generating 106.88 tCO₂, while petrol-powered vehicles used 3574.85, leading to 8.22 tCO₂ of emissions. In total, the company vehicles were responsible for 115.1 tCO₂ emissions for the year.

2. Stationary combustion in company facilities

Stationary emissions are attributed to diesel consumption in generators. Over the

year, 40,090 liters of diesel were used, with an emission factor of 2.7 kg CO₂ per liter, resulting in a total of 108.243 tCO₂ emissions from the generators.

3. Fugitive emissions from equipment leaks

Fugitive emissions from refrigerants occur when gases used in refrigeration and air conditioning systems are unintentionally released. These emissions contribute significantly to climate change due to their high Global Warming Potential (GWP), which enables them to trap substantial amounts of heat in the atmosphere. Here's a summary of the fugitive emissions from different refrigerants:

1. R-22 (Chlorodifluoromethane):
 - Amount released: 156 kg
 - GWP: 1810
 - Total CO₂ equivalent emissions: approximately 282.36 tons
2. R-410A:
 - Amount released: 32 kg
 - GWP: 1725
 - Total CO₂ equivalent emissions: approximately 55.2 tons
3. R-134A:
 - Amount released: 8 kg
 - GWP: 1300
 - Total CO₂ equivalent emissions: approximately 10.4 tons
4. R-32:
 - Amount released: 10 kg
 - GWP: 675
 - Total CO₂ equivalent emissions: approximately 6.75 tons

Total fugitive emissions: approximately 354.71 tons of CO₂ equivalent

These emissions highlight the environmental impact of refrigerants and emphasize the importance of managing and minimizing leaks to reduce their contribution to overall greenhouse gas emissions.

4. Process emissions from manufacturing

Process emissions under Scope 1 refer to direct greenhouse gas (GHG) emissions arising from specific industrial or chemical processes during production activities, rather than from fuel combustion. Such emissions, however, are not applicable to Chitkara University's Punjab campus.

For the reporting year, Chitkara University's total Scope 1 emissions amounted to approximately 578.243 tCO₂e. These emissions are primarily associated with fuel combustion in university-owned vehicles, stationary diesel generators, and fugitive emissions from refrigerants used in air conditioning systems. The breakdown is as follows:

- Fuel combustion in vehicles: 115.1 tCO₂e
- Diesel generator emissions: 108.23tCO₂e
- Fugitive emissions from refrigerants: 354.71 tCO₂e

To reduce Scope 1 emissions, the university has undertaken a range of proactive measures:

1. **Transition to Electric Vehicles (EVs):** Efforts are underway to replace diesel and petrol vehicles with electric alternatives, reducing emissions from campus transportation.

2. **Adoption of Renewable Energy:** Solar energy and other renewable sources are being increasingly utilized to power campus operations, cutting down reliance on diesel generators and supporting sustainability objectives.
3. **Regular Refrigeration System Maintenance:** Scheduled inspections and proper handling of refrigerants are conducted to prevent leaks, thereby minimizing fugitive emissions.
4. **Sustainability Awareness and Training:** Staff and students participate in training programs focused on energy efficiency, responsible vehicle use, and overall sustainable practices, fostering a culture of environmental stewardship.

Through these initiatives, Chitkara University is committed to curbing Scope 1 emissions and advancing toward a greener, more sustainable campus.

Scope 2

Scope 2: Reporting year missions represent indirect greenhouse gas (GHG) emissions associated with the purchase and consumption of energy, mainly electricity. While these emissions are generated off-site at the power plants that produce electricity, they are attributed to the university's carbon footprint because the electricity is used on campus.

For the reporting year, Chitkara University's purchased electricity consumption was **2634 kWh**, equivalent to **2.634 MWh**. Using the emission factor of **0.715 tCO₂/MWh** (based on the grid's energy mix), the calculated emissions are:

$$2.634 \text{ MWh} \times 0.715 \text{ tCO}_2/\text{MWh} = 1.88 \text{ tCO}_2\text{e}$$

Thus, total Scope 2 emissions for the year amount to **1.88 tCO₂e**.

Measures Taken to Reduce Scope 2 Emissions

Chitkara University has adopted a series of initiatives to minimize its Scope 2 emissions and advance toward a low-carbon campus:

1. **Integration of Renewable Energy:** The university continues to expand its solar energy capacity to reduce dependence on carbon-intensive grid electricity.
2. **Energy Efficiency Retrofitting:** Buildings have been upgraded with energy-efficient lighting, HVAC systems, and smart controllers to minimize electricity consumption.
3. **Behavioural Change Programs:** Staff and students are engaged through awareness campaigns and training sessions to encourage responsible energy use and conservation practices.
4. **Energy Monitoring and Reporting:** Continuous monitoring systems track

electricity usage and emissions, enabling timely interventions and targeted improvements.

Innovative Strategies for Further Reduction

5. To further strengthen its commitment to sustainability, the university is exploring additional forward-thinking approaches:
 1. **Smart Microgrid Development:** Establishing a campus-level microgrid that integrates solar panels, battery storage, and demand-response systems to reduce peak demand and improve energy resilience.
 2. **Green Building Certification:** Pursuing certifications (e.g., IGBC, LEED) for campus buildings, ensuring that new infrastructure adheres to advanced energy efficiency standards.
 3. **IoT-Enabled Energy Management:** Deploying smart meters and IoT-based energy management systems to optimize real-time energy consumption and detect inefficiencies.
 4. **Power Purchase Agreements (PPAs): Partnering** with renewable energy producers through long-term agreements to directly source clean electricity for the campus.
 5. **Carbon Neutral Campus Goals:** Setting a clear roadmap to achieve carbon neutrality in Scope 2 emissions by a target year, aligning with global climate commitments.
 6. **Energy Challenge Programs:** Launching inter-departmental competitions to reward the most energy-efficient practices and innovative conservation ideas.
 7. **Renewable Energy Integration in Curriculum:** Embedding renewable energy and energy efficiency modules into academic programs to foster student-led innovation on campus energy reduction.

Scope 3

Scope 3: emissions represent all other indirect greenhouse gas (GHG) emissions that result from an organization's activities but originate from sources outside its direct ownership or control. These emissions fall into 15 categories under the GHG Protocol and cover both upstream activities (such as raw material production and delivery) and downstream activities (such as transportation, consumption, and waste disposal of goods).

Scope 3 calculation methodologies

S. No.	Total Categories	Scope 3 categories applicable to Chitkara University
1.	Purchased goods and services	Yes
2.	Capital goods	N.A.
3.	Fuel and Energy-related activities not included in scope 1 or scope 2	N.A.
4.	Upstream transportation and distribution	N.A.
5.	Waste generated in operations	N.A.
6.	Business Travel	Yes
7.	Employee commuting	Yes
8.	Upstream leased assets	N.A.
9.	Downstream transportation and distribution	N.A.
10.	Processing of sold products	N.A.
11.	Use of sold products	N.A.

12.	End of life treatment of sold products	N.A.
13.	Downstream leased assets	N.A.
14.	Franchises	N.A.
15.	Investments	N.A.

Applicable Scope 3 Categories for Chitkara University

Of the 15 categories outlined in the GHG Protocol, the following were relevant to Chitkara University:

- Purchased goods and services
- Business travel
- Employee commuting

Other categories such as capital goods, upstream transportation, waste, downstream activities, and investments were not applicable during the reporting period.

Purchased Goods and Services:

Key contributors included:

1. Aggregates:

- **Weight:** 2.1 tonnes
- **Emission Factor:** 7.77 kg CO₂/tonne
- **Total Emissions:** 0.016317tons

2. Metals:

- **Weight:** 0.5 tonnes
- **Emission Factor:** 3,894.22 kg CO₂/tonne
- **Total Emissions:** 1.94711 tons

3. Glass:

- **Weight:** 0.02 tonnes
- **Emission Factor:** 843 kg CO₂/tonne

- **Total Emissions:** 0.01686 tons

4. Clothing:

- **Weight:** 0.005 tonnes
- **Emission Factor:** 22,310 kg CO₂/tonne
- **Total Emissions:** 0.11155 tons

5. Food and Drinks:

- **Weight:** 0.354 tonnes
- **Emission Factor:** 3,701.4 kg CO₂/tonne
- **Total Emissions:** 1.3102956 tons

6. Compost:

- **Weight:** 1.5 tonnes
- **Emission Factor:** 113.31 kg CO₂/tonne
- **Total Emissions:** 0.169965 tons

7. Metals (Aluminum):

- **Weight:** 0.053 tonnes
- **Emission Factor:** 9,122.64 kg CO₂/tonne
- **Total Emissions:** 0.48349992 tons

8. Scrap Metal:

- **Weight:** 0.03 tonnes
- **Emission Factor:** 3,567.6 kg CO₂/tonne
- **Total Emissions:** 0.107028 tons

9. Plastics (Average Plastic Film):

- **Weight:** 1.61 tonnes
- **Emission Factor:** 2,574.16 kg CO₂/tonne
- **Total Emissions:** 4.1443976 tons

10. Paper and Board (Paper):

- **Weight:** 0.012 tonnes
- **Emission Factor:** 919.4 kg CO₂/tonne
- **Total Emissions:** 0.0110328 tons

Key Insight: The bulk of emissions originated from metals, plastics, and food-related purchases, underscoring the need for more sustainable procurement and supply chain practices.

Initiatives to Minimize Emissions from Purchased Goods and Services:

Strategies to Reduce Impact:

1. Adoption of sustainable procurement guidelines favouring low-carbon and eco-friendly products.
2. Local sourcing of goods to minimize transport-related emissions.
3. Collaboration with suppliers to enhance sustainability standards.
4. Expansion of recycling and circular economy initiatives, especially for plastics and paper.

Business Travel

S. No.	Scope	Item/ Product/Service	Activity data (km/miles)	Emission factors	Carbon emissions in tCO ₂ e
1.	3	Business travel within India	1501256 km	0.121 kg CO ₂ /Passenger - km	181.65
2.	3	Int. flight travel-short haul	18 miles	0.207 kgCO ₂ /mile	0.003
3.	3	Int. flight travel-medium haul	85212 miles	0.129 kgCO ₂ /mile	10.992
4.	3	Int. flight travel-long haul	125682.5 miles	0.163 kgCO ₂ /mile	20.48

In the reporting period, the carbon emissions from business air travel at Chitkara University were calculated using the distance travelled and specific emission factors for domestic and international flights. For domestic air travel within India, a total distance of **15,01,256 km** was recorded, resulting in approximately **181.65**

tCO₂e based on the emission factor of 0.121 kg CO₂ per passenger-km.

For international travel, the emissions were categorized into short, medium, and long-haul flights. The short-haul flights amounted to 18 miles, contributing an additional **0.003 tCO₂e**. Medium-haul flights covered 85,212 miles, generating approximately **10.992 tCO₂e**, while long-haul flights accounted for **125,682.5 miles**, leading to emissions of around **20.48 tCO₂e**.

Overall, the total emissions from business travel reached **213.125 tCO₂e**, highlighting the significant impact of air travel on the university's carbon footprint.

Initiatives to Minimize Business Travel Emissions

To address the carbon footprint associated with air travel, the following initiatives are recommended:

1. **Promote Virtual Meetings:** Encourage the use of video conferencing tools to reduce the need for travel for meetings and collaborations.
2. **Train Staff on Sustainable Travel Practices:** Provide training on carbon offsetting and sustainable travel options to make informed choices when travel is necessary.
3. **Evaluate Travel Policies:** Review and revise travel policies to prioritize eco-friendly options and limit travel to essential trips only.
4. **Encourage Local Engagement:** Foster partnerships with local organizations to minimize travel distances for conferences and collaborative events.
5. **Carbon Offsetting Programs:** Implement programs that allow travelers to offset their carbon emissions through contributions to environmental projects.

Employee commuting

In the reporting year, Chitkara University's carbon emissions from employee commuting totalled approximately 451.05 tCO₂e tons of CO₂ equivalent. The emissions were calculated based on the distance travelled by different types of vehicles, including diesel, petrol, and hybrid cars, along with their respective emission factors.

Here's a breakdown of the emissions by vehicle type:

1. Small Diesel Car:

- **Distance:** 39,958 km
- **Emission Factor:** 0.13721 kg CO₂/km
- **Total Emissions:** **5.4 tons**

2. Large Diesel Car:

- **Distance:** 258455 km
- **Emission Factor:** 0.20419 kg CO₂/km
- **Total Emissions:** **52.77 tons**

3. Average Diesel Car:

- **Distance:** 2,001,254 km
- **Emission Factor:** 0.16844 kg CO₂/km
- **Total Emissions:** **337.09 tons**

4. Small Petrol Car:

- **Distance:** 57,520 km
- **Emission Factor:** 0.14836 kg CO₂/km
- **Total Emissions:** **8.5 tons**

5. Large Petrol Car:

- **Distance:** 165,487 km
- **Emission Factor:** 0.27807 kg CO₂/km
- **Total Emissions:** **46.01 tons**

6. Medium Hybrid Car:

- **Distance:** 12,054 km
- **Emission Factor:** 0.10698 kg CO₂/km
- **Total Emissions:** 1.28 tons

Conclusion

In 2025, Chitkara University achieved a **9.5% reduction in total carbon emissions** compared to 2024, demonstrating sustained environmental leadership and progress toward **carbon neutrality by 2029**.

Key drivers for this reduction included:

- **Optimized transportation systems,**
- **Lower refrigerant leakage,**
- **Enhanced renewable energy use,**
- **Digitalization of meetings reducing travel, and**
- **Sustainable procurement practices.**

The university's focus on **energy efficiency (LED retrofits, solar expansion, smart monitoring)** and **behavioural change campaigns** significantly strengthened its sustainability performance.

These ongoing initiatives have collectively cut emissions by 568.86 tCO₂e since 2022–23, achieving a 31% overall reduction within three years

Carbon Reduction Plan for Chitkara University

Introduction: Chitkara University is committed to becoming **carbon neutral** university by **2029** in **Scope 1, 2 and 3**. All efforts are towards reducing its carbon footprint by implementing sustainable practices and advancing renewable energy projects. With over 10,000 trees, plants, and shrubs, and annual increases in greenery, the university already demonstrates significant environmental consciousness. Additionally, the campus's **organic waste composter** and **paper recycling plant** contributes to waste management and circular economy goals. This carbon reduction plan outlines the strategies that will guide the university's journey towards a more sustainable future, focusing on energy, waste, and transportation.

Key Goals for 2029:

1. **Achieve 100% Renewable Energy Production** (Currently around 35%)
2. **100% Replacement of Incandescent Bulbs with LEDs.**
3. **Expand EV Charging Stations from 2 to 10.**
4. **Enhance Waste Management and Recycling Programs.**
5. **Increase Green Cover to Support Carbon Sequestration.**

1. Renewable Energy Expansion (SDG 7, SDG 13)

- **Target:** Increase renewable energy production from the current 35% to 100% by 2029.

Actions:

- **2024-2025:** Install additional solar energy systems.

- **2026-2027:** Monitor and optimize 35% of renewable capacity, reaching the 100% target by 2029.
- Implement smart grid technology to distribute renewable energy efficiently across the campus.

Impact: This expansion will significantly reduce the university's reliance on non- renewable energy sources, leading to a major decrease in carbon emissions from electricity use.

2. Energy Efficiency and Lighting (SDG 12, SDG 7)

- **Target:** Achieve 100% energy-efficient lighting across the campus by replacing all incandescent bulbs with LEDs by 2025.

Actions:

- **2024:** Replaced 75% of all incandescent bulbs with LED lighting.
- **2025:** Complete the replacement process, achieving 100% LED lighting.

Impact: Switching to LED bulbs will reduce energy consumption for lighting by up to 75%, contributing to lower carbon emissions and operational costs.

3. Electric Vehicle (EV) Infrastructure Expansion (SDG 9, SDG 11)

- **Target:** Expand the number of EV charging stations from 2 to 10 by

2029, promoting sustainable transportation on campus.

Actions:

- **2024-2025:** Install 2 additional charging stations.
- **2026-2027:** Increase the total to 6 charging stations.
- **2028-2029:** Install 4 more stations, achieving the target of 10.

Impact: By encouraging the use of electric vehicles and reducing fossil fuel consumption, the university will contribute to lower carbon emissions from transportation.

4. Waste Management and Recycling (SDG 12, SDG 13)

- **Target:** Maximize waste recycling and composting processes to reduce landfill contributions and support the circular economy.

Actions:

- **Organic Waste Composting:** Continue to recycle all organic waste using the existing composting facilities, converting waste into nutrient-rich compost for use in horticulture and gardening.
- **Paper Recycling:** Expand the paper recycling plant's capacity to ensure that all paper waste from campus operations is recycled effectively.
- Introduce awareness campaigns to encourage waste segregation at the source among students and staff.

Impact: Efficient waste recycling and composting will reduce methane emissions from organic waste, supporting the goal of lowering the

university's overall carbon footprint.

5. Green Cover and Carbon Sequestration (SDG 15, SDG 13)

- **Target:** Increase the number of trees, plants, and shrubs annually, with a goal of planting an additional 1,500 trees by 2029.

Actions:

- **Annual Planting Drives:** Organize annual tree-planting events involving students, faculty, and the local community.
- **Biodiversity Enhancement:** Introduce more native and drought-tolerant species to improve resilience to climate change.

Impact: Expanding the green cover will enhance carbon sequestration, improve air quality, and contribute to biodiversity on campus.

By implementing this detailed carbon reduction plan, Chitkara University will significantly reduce its carbon footprint and become **carbon neutral** university by **2029**. The combination of renewable energy expansion, energy efficiency, enhanced waste management, and green cover growth positions the university as a leader in sustainability and environmental responsibility. These initiatives not only contribute to global climate action goals but also foster a culture of sustainability within the university community.