Advancing Climate Action Through Scope 3 Emissions Evaluation and Reporting at the University of Calgary

Masumi Dhavalkumar Vaghasiya | Supervised by Dr. Marwa Hannouf, School of Public Policy, Dan Sudeyko, Facilities Development, and Travis Milnes, Campus as a Learning Lab

INTRODUCTION

- Scope 3 = indirect GHG emissions from procurement, commuting, travel, construction, and waste.
- In higher education, Scope 3 often makes up 70–90% of the total footprint.
- These emissions are harder to measure but essential for credible carbon neutrality.
- At UCalgary, official reporting has focused on Scope 1 & 2. A partial Scope 3 inventory (2011–12) by Lee highlighted key gaps but was not continued in later reporting.
- This study develops the first updated and comprehensive Scope 3 baseline (2023–24) to fill that gap and support UCalgary's 2050 carbon neutrality goal.

RESEARCH QUESTION

How can the University of Calgary enhance its Scope 3 emissions reporting by evaluating the material categories most relevant to higher education institutions?

OBJECTIVES

- Build a comprehensive Scope 3 baseline (2023–24) for UCalgary.
- Identify material categories and compare with 2011–12 results.
- Strengthen reporting systems for procurement, travel, commuting, waste, and energy.
- Provide recommendations to support UCalgary's 2050 neutrality goal, aligned with the SDGs.

This project applied an interdisciplinary lens across social/behavioral, energy, and environmental dimensions, aligned with SDG 11, 12, and 13.

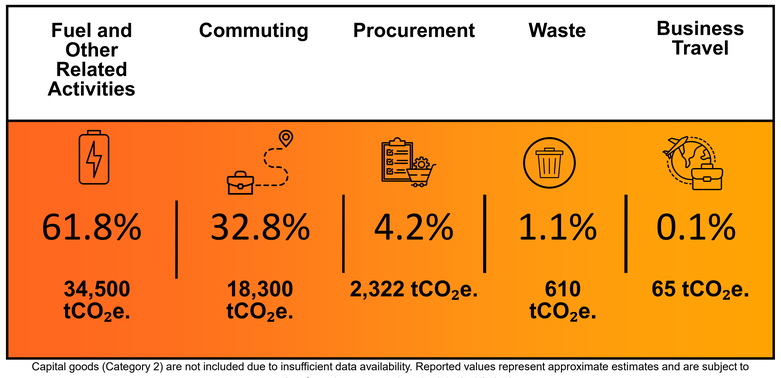
METHODOLOGY

This study follows the GHG Protocol Corporate Value Chain (Scope 3) Standard as the overarching framework. A hybrid approach was applied, combining procurement spend analysis, EEIO emission factors, product-level LCAs, commuting and travel surveys, and waste audits. To ensure both comparability and transparency, methods were tailored to each Scope 3 category based on available data, institutional context, and best practices in higher education. The table below summarizes the calculation approach used for each category. Future work should expand data coverage, improve survey response rates, and integrate Scope 3 into annual institutional reporting.

Category 01	PURCHASED GOODS & SERVICES	Procurement records analyzed with EEIO emission factors, validated using vendor product LCAs (Apple, Dell, Fisher Scientific).
Category 02	CAPITAL GOODS	Construction and infrastructure projects flagged; embodied carbon estimated using proxy factors and literature benchmarks (data gaps remain).
Category 03	FUEL & ENERGY-RELATED ACTIVITIES	Calculated upstream emissions (fuel extraction + T&D losses) from UCalgary's Scope 1 & 2 energy use using national factors.
Category 05	WASTE	Waste tonnage (landfill, recycling, compost) converted to CO_2e with treatment-specific emission factors; excluded streams noted.
Category 06	BUSINESS TRAVEL	Travel estimates reconstructed from expense records and past surveys; DEFRA and Atmosfair calculators applied for ranges.
Category 07	COMMUTING	2020 commuter survey data updated for 2024 campus population; distance-based method with mode-specific emission factors applied.

RESULTS

This study estimated Scope 3 emissions across five major categories at the University of Calgary for FY 2023–24. The analysis shows that fuel and energy-related activities and commuting together account for over 90% of total Scope 3 emissions, while procurement, waste, and business travel make smaller but still important contributions. Results highlight both the magnitude of indirect emissions and the data challenges inherent in measuring them. The category-specific findings below illustrate not only emissions totals but also key limitations and recommendations to guide future inventories and reduction strategies.



Capital goods (Category 2) are not included due to insufficient data availability. Reported values represent approximate estimates and are subject to uncertainty from data gaps and methodological limitations.

BEYOND THE PERCENTAGES

- Commuting adds one-third of Scope 3 emissions — the single largest behavioral source.
- Procurement emissions are underestimated. True values are likely much higher.
- Waste emissions have remained stable since 2011–12, reflecting higher diversion rates despite campus growth.
- Small share overall, but one long-haul flight can equal dozens of short-hauls.
- Most emissions come from upstream extraction and transmission, beyond direct campus control.

CATEGORY 1: PROCUREMENT

LIMITATIONS

- Only IT and lab equipment quantified; other services excluded due to data.
- Vendor emission data inconsistent; relied on EEIO averages + partial product LCAs.
- Spend-based methods risk underestimating emissions

RECOMMENDATIONS

- Integrate carbon-tagging fields in procurement systems.
- Require GHG disclosures from major vendors (e.g., IT, lab suppliers).
- Develop dashboards or internal tools to flag high-emission purchases.
- Use student-led internships/research for data cleaning.

CATEGORY 2: CAPITAL GOODS

LIMITATIONS

- Embodied carbon of construction not systematically tracked.
- No access to material-level data (concrete, steel, glass).
- Lack of integration between Facilities projects and GHG reporting.

RECOMMENDATIONS

- Apply embodied carbon calculators for new builds/retrofits.
- Adopt low-carbon construction standards (concrete, steel).
- Require contractors to report material footprints.
- Incorporate capital goods into UCalgary's annual inventory framework.

CATEGORY 3: FUEL & ENERGY RELATED

LIMITATIONS

- Based only on national average emission factors (upstream fuel, T&D losses).
- No supplier-specific data from electricity or natural gas providers.
- Does not reflect seasonal variation or peak demand impacts.

RECOMMENDATIONS

- Engage with energy suppliers for upstream data.
- Expand renewable power purchasing to lower upstream intensity.
- Use smart metering data to refine indirect energy estimates.

CATEGORY 5 : WASTE

LIMITATIONS

- Missing emissions from e-waste, hazardous & construction debris.
- Only high-level waste streams tracked (landfill, recycling, compost).
- Relied on average emission factors (no vendor-specific treatment data).

RECOMMENDATIONS

- Expand audits to cover all waste streams.
- Require vendors to disclose treatment methods.
- Develop department-level waste tracking.
- Use waste insights to support zero-waste targets.

CATEGORY 6 : BUSINESS TRAVEL

LIMITATIONS

- No centralized system for tracking university-funded flights.
- Estimates reconstructed from pre-COVID 2018–19 data (+10%).
- Excludes flight class, stopovers, and accommodations.

RECOMMENDATIONS

- Implement a central travel booking/tracking system.
- Incentivize low-carbon travel alternatives (rail, virtual).
- Introduce an internal carbon charge for flights (modeled on UofT's ATEMI).
- Prioritize reductions in long-haul discretionary trips.

CATEGORY 7 : COMMUTING

LIMITATIONS

- Based on 2020 survey, adjusted for 2024; may not reflect current mode share.
- Lacked granularity on trip chaining, ride-hailing, or part-time commuters.
- Excluded non-daily trips (e.g., occasional campus visits).

RECOMMENDATIONS

- Conduct regular commuter surveys with higher response rates.
- Incentivize transit, carpooling, cycling, and EV adoption.
- Expand sustainable transport infrastructure (bike lanes, charging stations).
- Track commuting emissions as a key KPI in sustainability reports.

CONCLUSION

This study provides UCalgary's most comprehensive Scope 3 baseline to date, showing that commuting and fuel and energy-related activities dominate indirect emissions, while procurement, waste, and travel also contribute meaningful shares. Persistent data gaps, particularly in capital goods and vendor disclosures, limit accuracy but point directly to where institutional systems can improve. Embedding Scope 3 into regular reporting and aligning actions with SDG 11, 12, and 13 will be critical for achieving UCalgary's 2050 carbon neutrality goal.

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