FINAL REPORT[1]

QUANTIFICATION OF SCOPE 3 EMISSIONS OF THE UNIVERSITY OF TORONTO JULY 25, 2024 (SHORT VERSION)

BY

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U OF T

Acknowledgement

We extend our heartfelt appreciation to Climate Positive Energy (CPE) at the University of Toronto for their generous funding, which played a pivotal role in making this project possible. Their commitment to supporting initiatives aimed at quantifying and reducing greenhouse gas emissions aligns seamlessly with our collective goal of fostering sustainability and combating climate change. This financial support from CPE has been instrumental in realizing the objectives of our study and advancing the University of Toronto's commitment to Climate Positive vision.

An understanding and quantification of Scope 3 emissions required a fuller understanding of the operations and finances of the university which would not have been possible without the support of Ron Saporta, V-P, Operations and Real Estate Partnerships and Trevor Rodgers, Chief Financial Officer and their teams. We also extend special thanks to the Sustainability offices across all three campuses, in particular Scott Hendershot, Kevin Leong and Chelsea Dalton at the St. George Campus, Ahmed Azhari, Beverly Ayeni, and Samantha Dilorio at the Mississauga Campus, and Jeffrey Miller, Patricia Escobar and Nadine Leone at the Scarborough Campus for their support.

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1.0 Introduction

Higher Education Institutes (HEIs) are critical players in the global race to net zero. The HEIs, in addition to their conventional role of education, research, and innovation related to climate change and GHG emissions reductions, have a leadership role in demonstrating how to track, assess, report, and reduce their own emissions. Assessment of emissions and communication of results lead to a better understanding of the impact of the activities of the institution on the environment and opens possibilities to reform habits and include more environmental-friendly practices in daily working schemes (Loyarte-L´opez et al., 2020). Recognizing the critical need to address climate change and its impact on the society, the University of Toronto has made a commitment to play a leading role against climate change.

In 2024, the University of Toronto was ranked the first in Sustainability in the world by the QS World University Rankings. The ranking is an outcome of several high-profile sustainability initiatives across U of T's three campuses in recent years. In 2017, President Meric Gertler established the "President's Advisory Committee on the Environment, Climate Change and Sustainability (CECCS)", and the committee has pioneered many important initiatives to advance its goals. All three campuses have Sustainability Offices, and these offices are committed to promote a culture of sustainability through a range of initiatives and active engagement of all stakeholders. A wide range of undergraduate and graduate courses cover 17 Sustainable Development Goals (SDGs) and many undergraduate and graduate programs, including Master of Science in Sustainability Management, addresses sustainability issues. The whole university community, that includes students, alumni, faculty and staff members, and administration at all levels, is playing a critical role in sustainability initiatives. Details of sustainability initiatives and sustainability offices are available at https://sustainability.utoronto.ca/

One of the key sustainability initiatives of the UofT is its commitment to becoming climate positive by 2050. In 2019, the St George campus announced its Low-Carbon Action Plan in which the three campuses set a target of reducing their GHG emissions by 37%, as compared to their emissions in 1990, by 2030. In 2021, St George campus took its commitment to becoming climate positive by 2050 (Climate Positive St. George campus by 2050). In 2023, UTM joined the pledge from the tri-campus vice-presidents of U of T to achieve a climate positive model by 2050 and released its Climate Positive Plan. In the same year (2023), this commitment was extended to all three campuses; the campuses together made a commitment to become climate positive by 2050 and have identified emission reduction goals for 2025, 2030, and 2050.

U of T President Meric Gertler observed:

> "*U of T is determined to lead by example in addressing climate change – a strategic priority of the university and one of the most pressing issues of our time*"
>
> "*The goal of becoming climate positive on all three campuses is bold and befitting of our mission as an educational institution that strives to make the world a better place*.[2]"

[2] https://www.utoronto.ca/news/u-t-s-plan-become-climate-positive-expanded-all-three-campuses#:~:text=%E2%80%9CU%20of%20T%20is%20determined,of%20T%20President%20Meric%20Gertler.

The current plans and commitments of the university include Scope 1 and 2 and exclude Scope 3 emissions. One of the main challenges of Scope 3 emissions is their estimation. With that in mind, the university established the Climate Positive Energy (CPE) research initiative in 2022 which is promoting climate related research. The CPE funded a research project to quantify the Scope 3 emissions of the UofT. The first estimation of Scope 3 emissions of the university are presented in this report.

In this report, we first discuss the framework dedicated to the quantification of Scope 3 emissions that is followed by a brief discussion of the academic literature and methodologies used to estimate Scope 3 emissions at HEIs. Following this contextualization, we present our methodology and estimations regarding Scope 3 emissions for University of Toronto (UofT). We also discuss the limitations of the estimates.

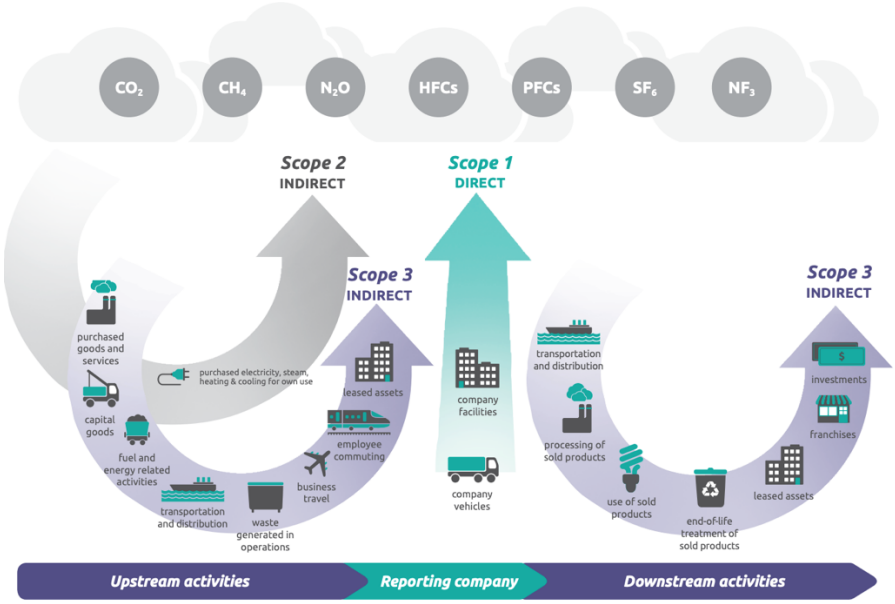
1.1 Carbon Footprint and Framework for Its Quantification

The GHG emissions can be measured in carbon dioxide equivalents (CO_2e) and are termed as "carbon footprint". A carbon footprint (CF) can broadly be defined as a measure of the GHG emissions that are directly and indirectly caused by an activity or are accumulated over the life stages of a product or service, expressed in carbon dioxide equivalents (Wiedmann and Minx, 2007).

Various frameworks, methodologies, and guidelines have been established to facilitate the comprehensive gathering, compilation, and management of greenhouse gas (GHG) emissions at both national and organizational levels. One of the most notable and accepted frameworks for measuring GHG emissions for companies/organizations, the GHG Protocol (WRI & WBCSD, 2004), classifies the emissions into three categories namely, Scope 1 (Direct Emissions from sources owned and controlled by the organisations), Scope 2 (Indirect Emissions from electricity, heat, steam consumed by the organisation) and Scope 3 (Indirect Emissions from sources not owned and controlled by the organisation but arise due to the activities of the organisation).

In the context of this report, we will be using the GHG Protocol Corporate Standard (WRI & WBCSD, 2004), a widely recognized and influential framework to measure the greenhouse gas emissions of the University of Toronto. The GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (WRI & WBCSD, 2011) builds upon this foundation by further categorizing Scope 3 emissions into 15 reporting categories.

Figure 1: Overview of GHG Protocol Scopes and Emissions across Value Chain



Source: Fig 1.1 GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (WRI & WBCSD, 2011)

This classification enables organisations to systematically measure and manage emissions throughout the entire value chain, fostering a comprehensive approach that encompasses both upstream and downstream activities.

2.0 Literature Review

The literature on quantification of Scope 3 emissions of universities can be found in peer reviewed scientific publications, Sustainability Reports of the Universities, and reports of some associations, such as the Canadian Association of University Business Officers (CAUBO)[3] and the Association for Advancement of Sustainability in Higher Education (AASHE)[4].

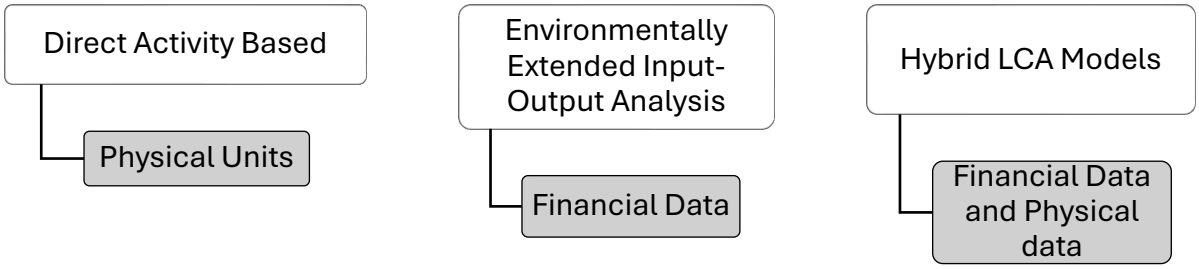
2.1 Methodology Used in Literature:

Three main methodologies have been applied in literature for estimation of emissions.

[3] CAUBO is a non-profit professional organization representing the chief administrative and financial officers at over 100 universities and affiliated colleges in Canada.

[4] Association for Advancement of Sustainability in Higher Education (AASHE) is comprised of over 900 members across 48 U.S. states, 1 U.S. Territory, 9 Canadian provinces and 20 countries.

Figure 2: Methodologies Used in Literature for Estimating Scope 3 Emissions



i. ***Direct Activity/Consumption Based:*** This approach involves collecting the quantitative measures of activity data and multiplying it with the appropriate GHG emission factor (see for e.g., Yanez et al., 2019; Cano Berrio et al., 2022). While activity data or supplier level data is collected for most categories, estimation of employee and student commuting is done through surveys (see for example Ozawa-Meida et al., 2013; Sangwan et al., 2018; and Yanez et al., 2019).

$$GHG\ Emission\ (tCO_2e) = \sum_{i=1}^{n} x^i * ef^i$$

Where x^i denotes the quantitative measure of the activity data from specific source and ef^i denotes the emission factor which means GHG emissions per physical unit of the activity.

ii. ***Environmentally Extended Input-Output Analysis (EEIOA):*** This is a top-down approach that allows tracking emissions using financial data (see for e.g., Larsen et al., 2013, Townsend & Barrett, 2013, etc.). It applies economic environmental accounting frameworks to map the structural components of direct and indirect demand for resources and follows the flow of emissions throughout the supply chain (Wiedmann, 2009). The expenditure data is multiplied with the appropriate EEIO emission factor which gives the CO_2e emissions per unit of money[5].

iii. ***Hybrid Life Cycle Analysis (LCA) models (e.g., EEIO-LCA, Organization-Product-Based-Life-Cycle Assessment):*** These models combine conventional process-based LCA and environmentally extended input–output analysis (EEIOA) in a variety of ways (Crawford et al., 2018). The primary motivations behind developing various hybrid LCA models are to reduce the truncation errors inherent in process-based LCA (Lenzen, 2000; Suh, 2004; Crawford et al., 2018) and/or to mitigate the aggregation

[5] An extension of the EEIO model is the Environmentally extended Multi-regional Input Output (EEMRIO) model that takes into account the global economic relationships and captures emissions across national and international supply chains. Within this broad group are studies that do not run EEIO models but rather use estimates from existing literature (Alvarez et al., 2014, Ozawa-Meida et al., 2013) or models that consider only national IOTs and hence do not estimate the indirect emissions abroad. For the studies using EEIOA or EEMRIO methods and using financial data for estimation of emissions, most papers are silent about the treatment of taxes and margins. Some papers such as Garcia-Alaminos et al., 2022 have removed taxes and margins.

errors rooted in EEIOA (Suh and Huppes, 2005), while maintaining the specificity and completeness of the system under study.

2.2 Findings in Literature

An analysis of existing literature, both published reports of organizations and scientific literature, shows that comprehensive measurement of Scope 3 emissions is lacking, with most studies focusing on 4-5 categories, primarily related to waste, student and staff commute, and business travel. A report by the Canadian Association of University Business Officers (CAUBO, 2022) finds that Scope 3 emission sources that are considered by the HEIs are Commuting (Employee and Student), Business Travel, Procurements (Purchased goods and Services) and Waste in Operations. While many peer-reviewed scientific publications cover emissions from procurement of paper, chemicals, lab supplies, and office equipment, few consider purchases of services. Business travel emissions are commonly included, but the extent varies, typically only considering air travel and neglecting other modes and overnight stays. Emissions from employee commuting, waste, and fuel and energy activities are often calculated, but student commute emissions are usually excluded.

Comparisons among carbon emissions of different universities are difficult given the heterogeneity across HEIs, in terms of population sizes, sources of GHG emissions, and variations in their estimation methodologies, particularly regarding scope 3 emissions (Cano et al., 2022). We discuss some common findings.

The annual carbon footprint has been estimated in all the studies reviewed. The estimates of Scope 3 emissions vary from around 19 to 90 percent based on the categories estimated. Studies such as Klein-Banai et al., 2010; Letete et al., 2011; Bailey and Lapoint, 2016 estimated emissions from only a few categories like business travel, employee commuting and waste hence the percentage of emissions from Scope 3 is below 30 percent. Emissions from purchased goods and services and capital goods, even when estimated concentrated only on paper, food, or chemicals. A comprehensive estimation of emissions from purchases has been done by Alaminos et al., 2022 who include paper & printing, food, telecom, wholesale & retail trade, other business services, other industries, education services etc. Furthermore, emissions from employee commute is an important source of emissions. Emissions from student commute have been neglected by all studies considered except Ozawa-Meida et al., 2013 and Sangwan et al., 2018. Notably, peer-reviewed studies overlook emissions from investments, which can significantly impact Scope 3 estimates. Some universities have estimated emissions from investments, yet these findings remain absent from comprehensive Scope 3 estimations in peer-reviewed literature. The calculation of a university's carbon footprint has mostly been done either through a consumption (activity based) estimation or an Environmentally Extended Input-Output-Analysis (EEIOA).

In conclusion, it is evident that there is a lack of comprehensive measurement of Scope 3 categories. Moreover, the GHG emissions inventory for Scope 3 is not standardized. Most literature as well as sustainability reports of institutes have measured emissions from commuting, travel, and waste. Procurements, where measured, concentrated on mostly on food, paper and lab materials. However, even when only a few categories of purchased goods and services were considered, procurements were a large contributor (20-60%) of the total Scope 3 measured.

3.0 Scope of the Report

3.1 Organizational Boundary:

The scope of this report on greenhouse gas (GHG) emissions is limited to the activities and operations of the University of Toronto. The estimation includes all relevant sources of GHG emissions associated with its infrastructure, energy consumption, transportation, and other pertinent activities within its organizational structure. The estimates of Scope 3 GHG emissions include all three campuses of UofT

- St. George Campus
- Mississauga Campus
- Scarborough Campus

Nine hospitals[6] and three federated colleges[7] are fully affiliated with the University of Toronto but have their own independent financial, operational, and governance systems. Hence, these nine hospitals and three federated colleges are not included in the estimation of Scope 3 emissions of the UofT.

In addition, data regarding activity or expenses of third-party food vendors operating at the University of Toronto Campuses was not available and therefore their emissions could not be estimated which are part of Scope 3 emissions of the university.

Out of three federated colleges, St Michael's college opted to participate in this project. Hence, we have submitted a separate report to the St Michales' college.

3.2 Temporal Boundary:

The greenhouse gas (GHG) emissions are estimated for the period 2017-18 to 2022-23.

4.0 Methodology

The computation of Scope 1 and 2 emissions relies on measured and reported activity data, specifically energy consumption. However, quantification of Scope 3 emissions of a higher education institution is complex. Studies, such as Wilson & Primo (2015) and CAUBO (2022), have found that only 11 out of the 15 categories of Scope 3 emissions are relevant in higher education institutions; details of these categories are given in Table 1. The report therefore focuses on measuring these 11 categories of Scope 3 emissions for UofT.

Table 1:Relevance of Scope 3 Categories for HEIs

GHG Scope 3 Category	Category Name	Examples in HEIs	Relevance	
			CAUBO, 2022	Wilson & Primo (2015)
1	Purchased Goods and Services	Office supplies, furniture, food, chemicals, cleaning agents	High	High
2	Capital Goods	Capital Projects: Building	Medium	High
		Capital Equipment: Lab equipment, Computers, Machinery, Vehicles		

[6] https://temertymedicine.utoronto.ca/fully-affiliated-hospitalsresearch-institutes

[7] The three federated colleges are – St Michael's College, Victoria College, and Trinity College.

3	Fuel and Energy Related	T&D Losses, Transport & Non-transport fuels, natural gas and electricity (not included in Scope 1&2)	High	Medium
4	Upstream Transport & Distribution	Inbound and Outbound Logistics: Couriers, mails, (including between campuses)	Medium	Medium
5	Waste	Third party Transportation, Disposal & Treatment of all types of waste	High	Medium
6	Business Travel	Road, Air Travel by faculty and staff	High	High
7	Employee Commuting	Car, Bus, Train travel by faculty and staff	High	High
8	Upstream Leased Assets	Electricity, steam, heating and cooling, specific for leased buildings , fuel use in leased vehicles	Medium to High	Medium
9	Downstream T&D	Student Commute	High	High
13	Downstream Leased Assets	Emissions from electricity or natural gas from leased buildings , fuel use in leased vehicles	Medium	Medium
15	Investments	Equity investments, debt investments, pension funds	High	High
10	Processing of Sold Products	Not Relevant		
11	Use of Sold Products			
12	End of Life Treatment of Sold Products			
14	Franchises			

The Scope 1 and 2 emissions data for the University of Toronto (UofT) was obtained from the Sustainability Office across all three campuses. As per the technical guidelines outlined in the WRI & WBCSD, 2013 for calculating Scope 3 emissions, organizations may opt for a blend of calculation methodologies across various Scope 3 categories within their inventories, as well as for different activities within each category. Consequently, both the Spend-Based Method and the Activity-Based Method were employed to estimate the Scope 3 emissions of UofT. The specific methodologies utilized for estimating Scope 3 emissions across different categories are provided in Table 2, with further elaboration on these methods to follow.

Table 2: Estimation Methods Used for Different Categories of Scope 3 Emissions

Category		Methodology Used for Estimating Emissions
Category 1	Purchased Goods and Services	Spend-Based Method
Category 2	Capital Goods	

Category 3	Fuel and Energy Related Activities	Activity-Based Method
Category 4	Upstream Transportation and Distribution	Spend-Based Method
Category 5	Waste Generated in Operations	Activity-Based Method (Waste Audit Reports)
Category 6	Business Travel	Spend-Based Method
Category 7	Employee Commuting	Activity-Based Method (Survey)
Category 8	Upstream Leased Assets	Spend-Based Method
Category 9	Downstream Transportation and Distribution (Student Commute)	Activity-Based Method (Survey)
Category 10	Processing of Sold Products	Not Relevant for HEI
Category 11	Use of Sold Products	
Category 12	End of Life Treatment of Sold Products	
Category 13	Downstream Leased Assets	Spend-Based Method
Category 14	Franchises	Not Relevant for HEI
Category 15	Investments	Estimates from Investment Reports

Note: Campus wise estimates were made for Category 3, 5, 7 and 9 while other categories were estimated at the combined level for all three campuses together.

4.1 Spend-based Method (For Category 1, 2, 4,6, 8, and 13)

In this method, emissions estimates are calculated by collecting data on the economic value of goods and services purchased by an organization, categorizing the data into different industrial sectors (as per the categories of Statistics Canada used in Input-Output Tables), and multiplying the total value of goods and services of each sector by the sector-specific (e.g., industry average) emission factors e.g., average emissions per monetary value of goods (WRI& WBCSD, 2013). To compute emissions through the 'spend-based' method, we used financial data provided by finance department of UofT. The data was run using the selected list of GL accounts. Since the GL accounts are aggregated for the entire University and common or shared across the 4 types of funds, the data provided includes all expenses under- Operating Fund, Ancillary Operations, Capital Fund and Restricted Funds. The GL balances include all budget sources - University operating Funds as well as Research Accounts.

This data was categorized into different industrial sectors and then multiplied by the applicable emission factor (emissions per dollar) obtained from Statistics Canada. Since Statistics Canada's emission factors are available only up to 2020, the financial values of the good and services of years after 2020 were first converted to 2020-dollar value using the inflation indices for different years published by Statistics Canada. A key part of the analysis was matching the GL codes (used in Financial Reports of the UofT) to Statistics Canada's Industrial Sectors so that the corresponding GHG emission factors (intensities) can be used to calculate the emissions. Some GL codes correspond directly to the Statistics Canada's Industrial sectors while others were classified based on the closest sector that matched the description of the GL.

4.2 Activity-Based Method (for Category 3, 5, 7, and 9)

In the case of activity-based method, the GHG emissions are calculated by multiplying the total use of a particular type of good and service measured in physical units by its emission factor (emission per physical unit). The sources of data of physical activities of different categories

of Scope 3 emissions varied. The sources of data used were: (i) Campus-wise energy and fuel consumption data for Category 3 (Fuel and Energy Related Activities); (ii) Campus-wise reports on waste generated and waste audit for Category 5 (Waste Generated in Operations); and (iii) Campus wise Commute Survey for Category 7 (Employees Commute) and Category 9 (Students Commute).

4.2.1Waste generated in operations

To calculate emissions resulting from waste generated during operations, we collected campus-specific estimates of annual waste generation for the period 2017-2023 categorized into organics, recycled materials, and landfill waste. For each category of waste, the annual tonnage was subdivided into constituent materials such as plastics, metals, paper, aluminium, glass, food, organic products, electronics, etc. utilizing the proportions derived from comprehensive waste audit reports. Data on various types of recycled and composted waste are gathered from the Waste Diversion Summary provided in the waste audit reports. However, in order to calculate the type of waste sent to landfill, we calculated the difference between the annual material generated (MT) and the annual 3Rs quantity captured (MT) provided in the "Capture Rate Summary[8]" table. The emission factor utilized in this computation is sourced from EPAs Emission Factors for GHG Inventories[9]. Subsequently, the appropriate emission factors corresponding to each sub-category of waste material were applied to calculate emissions stemming from organics, recyclables, and landfill waste respectively. These campus-specific estimates were then aggregated to derive comprehensive totals, providing the emissions associated with waste generated across the University's three campuses.

4.2.3 Commute Survey

To ascertain and quantify emissions resulting from employees and students commuting, separate campus wise surveys were conducted between July 2023-Jan 2024 encompassing all faculty and staff members affiliated with the respective campus and the students enrolled therein. This survey systematically gathered academic term-wise data regarding the various modes of transportation adopted by the participants to travel to campus. Participants were requested to input data covering the four terms- Fall, Winter, Spring and Summer. Subsequently, for each campus, term-wise average emissions per respondent category were calculated for seven categories of respondents (staff member, faculty member, and students in first, second, third, fourth, and fifth year of undergraduate studies and graduate studies), and these averages were then multiplied by the total number of members in respective categories.
The following assumptions were made:

a. We assumed that on an average part-time employee's emissions were 50% of the full-time employee’s emissions.
b. The commute patterns of all groups (students and employees) in all years of calculations were the same as in the year of survey.
c. The reduction in emissions observed during the COVID-affected years (FY 2020, 2021, and 2022) for business travel was extrapolated to estimate the corresponding decrease in emissions from faculty and student commuting.

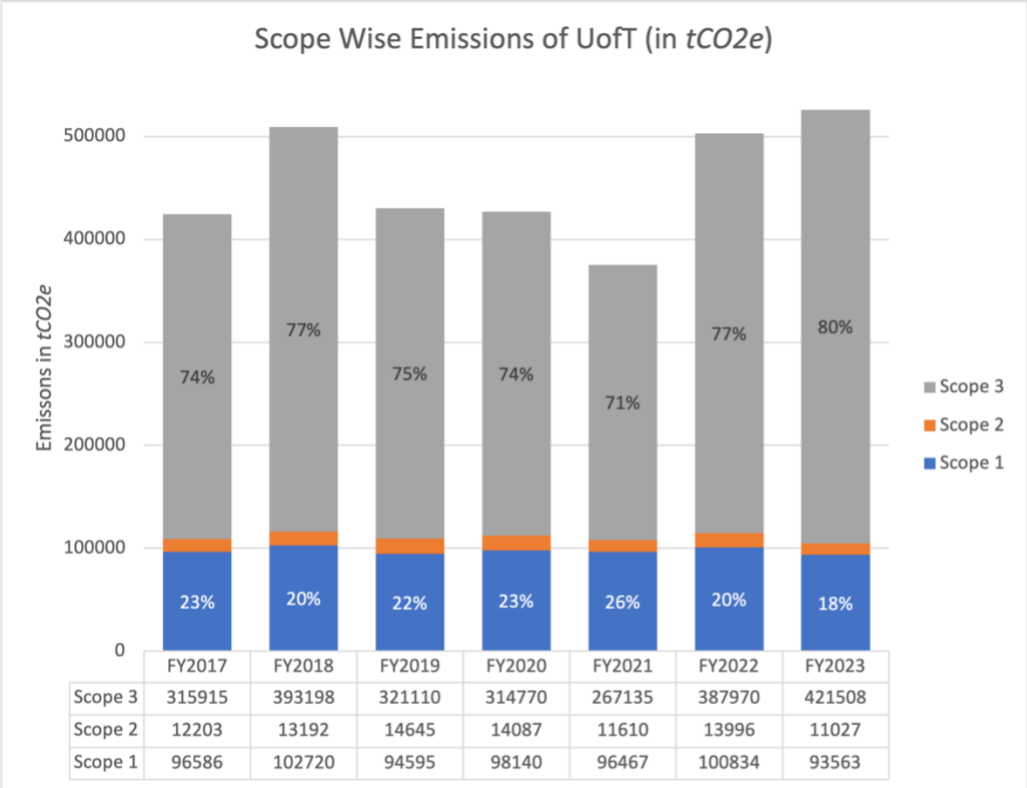
[8] Capture Rate Summary table gives details of the annual material generated (measured in metric tons (MT)) and the annual quantity captured through the 3Rs approach (reduction, reuse, and recycling).
[9] Note that the EPA chart employs short tons as its unit, whereas the U of T waste audit adopts metric tonnes. Thus, to ensure consistency, the waste generated data were converted into short tons using the conversion formula: Quantity of Waste (MT) × 1.102.

5.0 Results

5.1 Emissions of UofT (Scope 1, 2, and 3)[10]

In the fiscal year 2023, the university emitted a total of 526,098 tCO2e (without accounting for emissions from investments), with Scope 1, 2, and 3 emissions accounting for approximately 18%, 2%, and 80%, respectively. Figure 3 depicts the GHG emissions of the University of Toronto from fiscal years 2017 to 2023. The emissions reveal notable fluctuations over the years. Fiscal years 2020 and 2021 depict a decrease in absolute emissions, attributed to reduced on-campus activity during the COVID-19 pandemic. However, excluding the pandemic-affected years, UofT's GHG emissions have shown a general upward trajectory, with the exception of the 2018-19 period[11]. On average between FY 2017-FY2023, Scope 3 emissions amounted to three times the total emissions of Scope 1 and Scope 2. However, this ratio recently increased with Scope 3 emissions now reaching four times the combined emissions of Scope 1 and Scope 2 (Table 3).

Figure 3: Total GHG Emissions of UofT (tCO2e)- Without Investment



	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023
Scope 3	315915	393198	321110	314770	267135	387970	421508
Scope 2	12203	13192	14645	14087	11610	13996	11027
Scope 1	96586	102720	94595	98140	96467	100834	93563

[10] All estimates presented in this report exclude emissions from investment.

[11] In 2018-19, UofTs 6.5MW gas fired cogeneration system experienced a failure that resulted in a significant downtime of 234 days. This resulted in a significant reduction in natural gas consumption for that fiscal year, which in turn is the primary reason for the scope 1 and hence overall GHG reduction.

Table 3: Percentage Breakdown of Scope 1, 2 & 3 Emissions

Year	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023
Scope1	23%	20%	22%	23%	26%	20%	18%
Scope2	3%	3%	3%	3%	3%	3%	2%
Scope 3	74%	77%	75%	74%	71%	77%	80%

The normalization of emissions data per student and per employee provides interesting perspectives on the GHG emissions of the university. Notably, emissions per student, per employee, and consequently per capita have demonstrated an upward trend in recent years, barring FY 2021, which experienced a reduction in on-campus activities due to the impact of COVID-19. Interestingly, emissions per $1000 of expenses have remained relatively consistent, around 0.15 tonnes of CO2 equivalents. Possible factors contributing to these trends may include expanded campus infrastructure, and/or changes in energy consumption patterns, increase in campus activity etc.

Table 4: Some Key Statistics (tCO2e)

Indicator	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023
Emissions per $1000 of expenses	0.15	0.17	0.14	0.13	0.11	0.15	0.14
Emissions per employee	39.60	46.09	37.95	36.70	31.81	41.23	41.34
Emissions per student	5.82	6.88	5.72	5.58	4.67	6.19	6.49
Emission per capita	5.07	5.99	4.97	4.84	4.07	5.38	5.61

**Note: Expenses comprise the total expenditures reported in the University of Toronto's Annual Financial Reports across various years, including salaries, wages, scholarships, and more.*

5.2 Composition of Scope 3 CO2 Emissions of UofT

The total Scope 3 emissions for UofT for FY 2023 were about 421,500 tonnes CO2e. Scope 3 emissions have been increasing over the period of study. The composition of Scope 3 emissions is given in *Table 5*. Almost half of the Scope 3 emissions are contributed by purchased goods and services while capital goods contributes ~20% of the total Scope 3 emissions, followed by emissions from fuel and energy related activities (13%) (

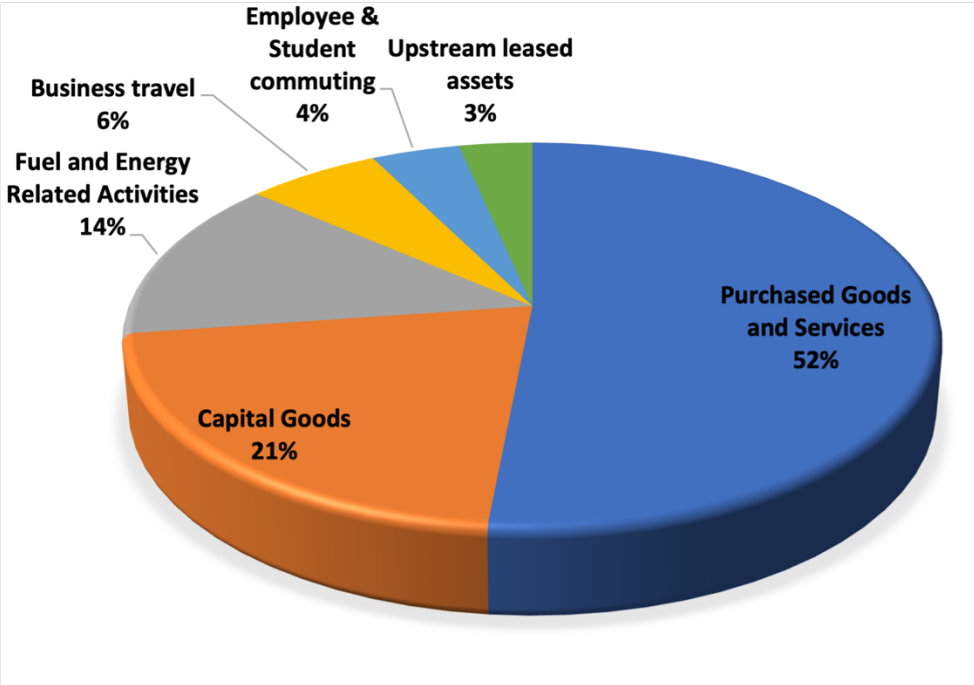
Figure 4).

Table 5: Scope 3: Category Wise Emissions (tCO2e)

Category	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023
Purchased Goods and Services	160,233	166,877	180,378	156,124	145,876	201,942	207,114
Capital Goods	50,300	104,785	32,278	50,935	56,265	115,769	112,228
Fuel and Energy Related Activities	47,490	48,073	46,907	44,926	42,826	44,432	44,902
Transportation and Distribution	2,262	2,478	1,944	1,764	1,738	1,505	1,364
Waste Generated in Operations	2,263	2,402	2,621	2,231	996	949	1,303

Business travel	31,095	32,378	32,733	32,277	1,926	2,180	11,861
Employee commuting	3,388	3,505	3,615	3,654	218	460	4,121
Leased assets	4,108	17,681	5,316	4,955	10,747	18.867	22,293
Downstream transport and distribution (Students commute)	14,776	15,020	15,318	15,275	917	1,866	16,323
Total excluding Investment	**315,915**	**393,199**	**321,110**	**312,142**	**261,510**	**387,970**	**421,508**

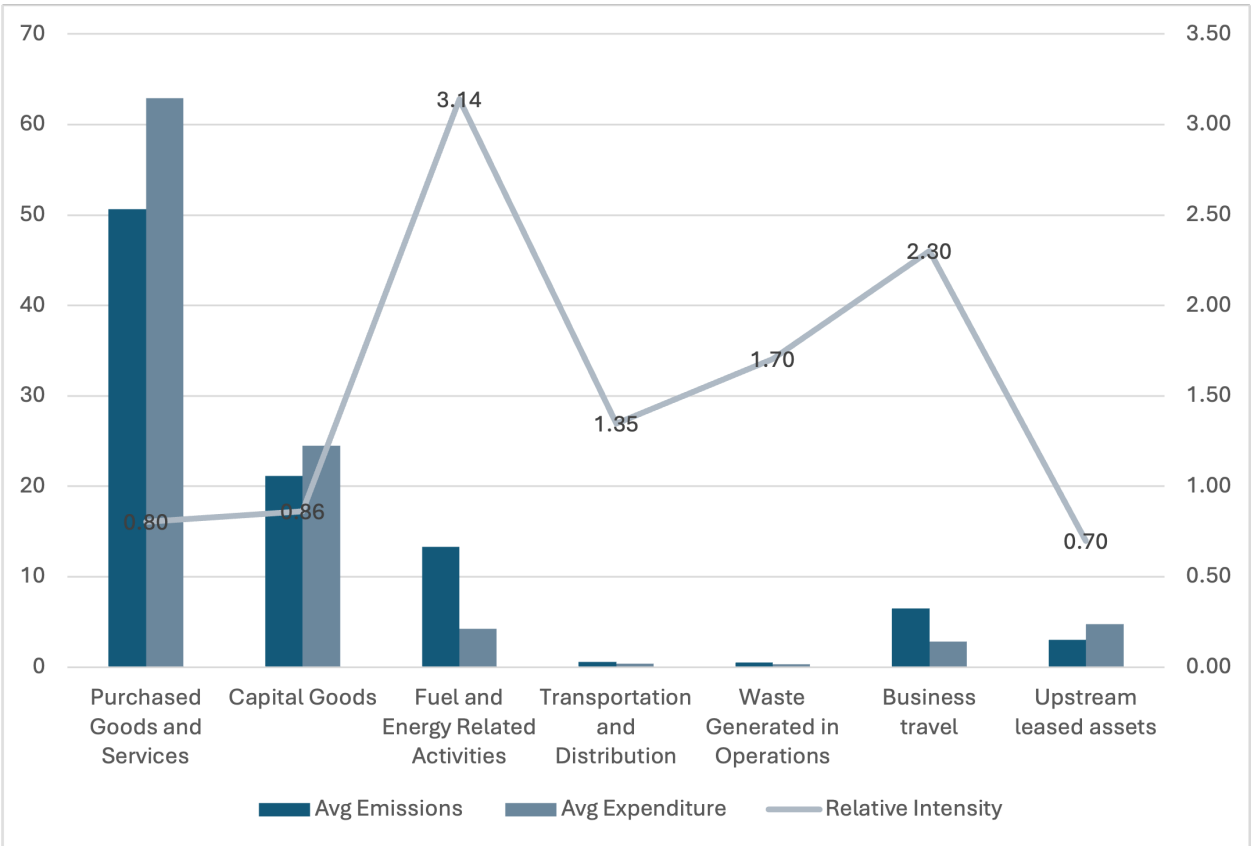
Figure 4: Scope 3: Category Wise Average Percentage Emissions (Average over 2017-23)



Finally, while purchased goods and services contribute the largest absolute emissions, the relative intensity of emissions per dollar is highest for fuel and energy related activities, followed by business travel and waste generated in operations (

Figure 5). This underscores the importance of targeted interventions to reduce emissions associated with energy consumption, transportation, and waste management in addition to focusing on emissions from purchased goods and services and capital goods.

Figure 5: Relative Intensity of Emissions per Dollar



6.0 Conclusion

In conclusion, inarguably Higher Education Institutes can play a crucial role in advancing the global agenda for net-zero GHG emissions. The commitment of institutions, such as the University of Toronto, to combat climate change is evident in their comprehensive plans and strategic initiatives. The study quantified Scope 3 carbon emissions, acknowledging the complexity in calculating emissions from various activities.

The adoption of the GHG Protocol Corporate Standard and the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard provides a robust framework for understanding and managing emissions comprehensively. The report delved into the organizational and temporal boundaries, specifically narrowing down to 11 relevant categories of Scope 3 emissions for UofT, relevant to the higher education context. Methodologically, the report utilized a combination of Spend-Based and Activity-Based methods for estimating emissions, ensuring a detailed and accurate representation of UofTs carbon footprint. Despite certain limitations, such as incomplete data for some categories, the report provides a comprehensive analysis.

Over the period under study, from 2017-18 to 2021-23, Scope 1 emissions consistently contributed approximately 18-20% to the total carbon emissions of UofT reflecting direct emissions from owned and controlled sources. Scope 2 emissions fluctuated within the range of 1-2%, encompassing indirect emissions from electricity, heat, and steam consumed by the institution with the bulk of the emissions from Scope 3 emissions, shaping UofT's overall

carbon footprint. The results also highlight a noteworthy shift in emissions during the COVID-19 impacted year, with Scope 3 emissions declining in 2020-21, followed by a rebound in 2021-22. Purchased Goods and Services, Capital Goods, and Employee Commute emerge as significant contributors to Scope 3 emissions. The detailed breakdown of emissions from Purchased Goods and Services and Capital Goods reveals the importance of food and beverages and the cyclical nature of construction/special projects.

The findings emphasize the need for ongoing efforts in emission reduction strategies, especially in pivotal categories, and underscore the importance of regularly updating data and methodologies to ensure the most accurate and up-to-date representation of its carbon footprint. Since Scope 3 emissions constitute a significant portion, focus on strategies to reduce emissions from purchased goods and services, student commute, and capital goods will help to reduce UofTs total carbon footprint. Overall waste generated by UofT has reduced in the last few years. This effort must be continued. Finally, measurement, monitoring and assessment of emissions data to identify trends and areas for improvement should be done annually to ensure the path to net-zero emissions.

In essence, this report serves as a tool for UofT and similar institutions, offering insights into their carbon emissions landscape and guiding strategic decisions towards achieving sustainability goals. Future studies are expected to overcome the constraints of this research, which are attributed to the unavailability of certain data, such as information from third-party food vendors operating within university campuses.

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