



UNIVERSITY
OF ALBERTA

Operational GHG Emissions Reduction Plan

2025

13 CLIMATE
ACTION



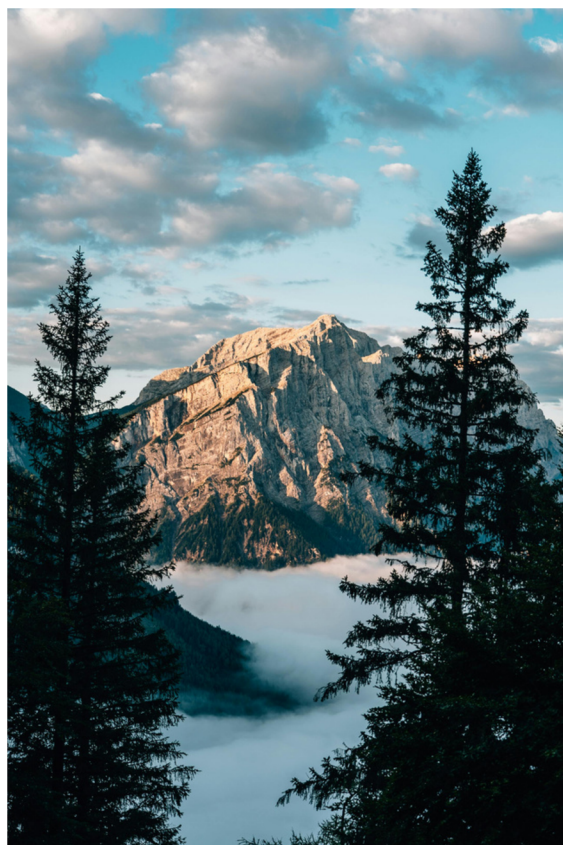
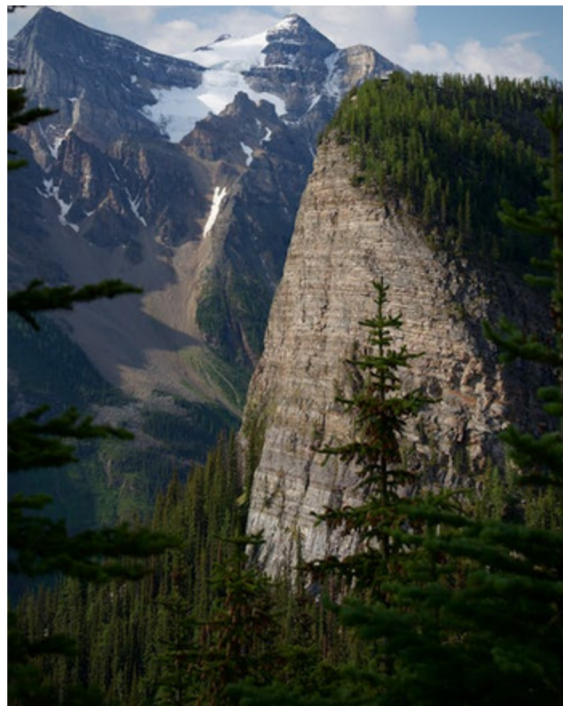
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Executive Summary

The University of Alberta recognizes the need to reduce our operational GHG emissions and continue our role as leaders in sustainability and climate change mitigation. This plan provides an overview of our current efforts to reduce our operational GHG emissions and provides future targets that we aim to achieve. The University of Alberta will expand our reduction efforts to further cut GHG emissions stemming from energy, buildings, waste, transportation, and water.

While external factors have created additional challenges to maximize our emission reductions, we have created a pragmatic plan to achieve significant gains towards a more sustainable academic institution. Our progress will be monitored publicly through our sustainability dashboards, publicly available reports, and several reporting frameworks such as the QS (Quacquarelli Symonds) World University Rankings, QS Sustainability Rankings, Time Higher Education World University Rankings, and the Times Higher Education Impact Rankings.



Land Acknowledgement

The University of Alberta, its buildings, labs and research stations are primarily located on the territory of the N hiyaw (Cree), Niitsitapi (Blackfoot), M tis, Nakoda (Stoney), Dene, Haudenosaunee (Iroquois) and Anishinaabe (Ojibway/Saulteaux), lands that are now known as part of Treaties 6, 7 and 8 and homeland of the M tis. The University of Alberta respects the sovereignty, lands, histories, languages, knowledge systems and cultures of all First Nations, M tis and Inuit nations.

About the University

The University of Alberta is one of Canada's top teaching and research universities, with an international reputation for excellence across the humanities, sciences, creative arts, business, engineering, and health sciences. Home to more than 42,000 students and 14,000 faculty and staff, the university has an annual budget of \$1.9 billion and attracts more than \$500 million in sponsored research revenue. The University of Alberta offers close to 900 undergraduate, graduate, and professional programs in 18 faculties on five campuses including one rural and one francophone campus. The university has more than 275,000 alumni worldwide.



Introduction

Overview

The University of Alberta recognizes the need for greenhouse gas emission reduction to mitigate global climate change, and believes that as an academic institution, we are uniquely positioned to lead the way. Our new plan, “Shape: A Strategic Plan of Impact”, details our mission to shape the future through ideas, trust, and experience. By fostering these elements, we aim to forge an innovative path to a low-carbon future.

As an academic institution, the University of Alberta is uniquely positioned to respond to climate change. The University of Alberta not only invests in current climate change mitigation strategies, but also acts as a living laboratory, performing new research and contributing to the development of innovative technologies that push the boundaries of low-carbon energy and alternatives.

Furthermore, the University of Alberta aims to educate and develop the leaders of tomorrow through the integration of sustainability into academics. At present, the University of Alberta offers four undergraduate Sustainability courses (SUST 201, 202, 300 and 410), an embedded Certificate in Sustainability for undergraduate students, including various experiential learning opportunities and programs (volunteering, internships, etc). The organization is working towards graduate-level offerings in Fall 2025, in partnership with the College of Natural and Applied Sciences (CNAS).



In addition, multiple faculties and departments continue to advance the U.N. Sustainable Development Goals (SDGs) across our curricula and offer climate change related courses, programs, and certificates.

Having surpassed our former target (17% GHG emissions reduction from 2005 levels, by 2020), we now look toward further improvements, and continuing our journey as a leader in climate change mitigation.

Our Motivation

Our 2023 plan, “Shape: A Strategic Plan of Impact” defines sustainability as a core commitment, deeply embedded in all University of Alberta practices. This is reflected in the development of our comprehensive Operational GHG Emissions Reduction Plan.

This plan serves to re-affirms our core commitment to sustainability and our intent to advance a low-carbon future for the University of Alberta.

The Status of Climate Change

There is no longer any doubt that climate change is occurring and that human interference with the climate system is a leading cause. The 2014 report from the Intergovernmental Panel on Climate Change (IPCC) states once again that climate change poses substantial risks for human and natural systems (IPCC 2014). The IPCC previously determined that aspects of climate change will persist for many centuries even if emissions are reduced, and to avoid further warming and irreversible changes substantial and sustained greenhouse gas emission reductions must be achieved (IPCC 2013).

More recent IPCC reports provide an even more dire call to action. The Climate Change 2023 Synthesis report indicates 1.1 degrees of global warming has already occurred, and that current policies make it likely that 1.5 degrees of warming will be exceeded. The report further comments that limiting 2 degrees of warming under current conditions will be very difficult. These facts are made all the more alarming by previous IPCC reports (Special Report on Climate Change 2019), clearly indicating that preventing 1.5 degrees of warming is crucial to avoiding the most catastrophic effects of climate change. As such, the urgency and scale of this global challenge is a call to action for all parties to commit to a swift transition to a low-carbon future.



To address this global need, Canada ratified its entry into the 2016 U.N. Paris Agreement, committing to reducing its greenhouse gas emissions by 30% below 2005 levels by 2030. To adjust for the continued warming, Canada passed the Canadian Net Zero Emissions Accountability Act in June 2021, setting forth legal requirements for governments to plan, report, and course correct towards a path to net zero emissions by 2050. Furthermore, a 2030 Emissions Reduction Plan was developed to guide the country along the path to meeting Canada's revised short term emissions reduction goal under the Paris Agreement (reducing emissions to 40-45% below 2005 levels).

Additional plans such as Alberta's Emissions Reduction and Energy Development Plan, and the City of Edmonton's Greenhouse Gas Management Implementation Plan, have been developed to provide additional guidance on how to achieve their reduction targets and meet the criteria set forth in these plans.



Present Plans

Our sustainability goals have been documented and carried out through a series of actionable plans which focus on reducing GHG emissions from energy, buildings, waste, transportation, and water. While the connection between energy production and GHG emissions is well known, water and waste also contribute to the production of greenhouse gases. Large quantities of energy are required to extract, purify, deliver, heat/cool, treat, transport, and dispose of wastewater. Methane is also produced from landfilled waste. By addressing all these aspects of sustainability, we can optimize our operations to reduce our GHG emissions as much as possible. Below is a summary of the University of Alberta's active sustainability plans.

Yearly Academic Action Planning (by the Sustainability Council)

Envision Energy Reduction Master Plan (EERMP, 2022-2030)

University of Alberta Zero Waste Plan (2022-2032)

Water Management Plan (2022/23)

A summary of the intent and scope of all University of Alberta sustainability plans (including past plans) is available in Appendix A: Overview of Current and Past Plans.

Our Core Values

Crucial to the process of creating a comprehensive GHG emissions reduction plan, is determining our core values and aligning our approach to match this. We are intent on creating a vision in line with the values and goals defined by the United Nations Sustainable Development Goals (SDGs), and consistent with the criteria for the Association for the Advancement of Sustainability in Higher Education (AASHE) – Sustainability Tracking, Assessment & Rating System (STARS) program. These values will form the foundation of our GHG emissions reduction journey.

The following pages outline current University of Alberta initiatives which address and embody the values put forth in the Sustainable Development Goals.



2 ZERO HUNGER



This ranking focuses on universities' research on hunger, their teaching on food sustainability, and their commitment to tackle food waste and address hunger among students and local communities.

The University of Alberta Sustainable Food Working Group Initiatives include campus food waste tracking, sustainable food choices, and healthy/affordable food choices.

6 CLEAN WATER AND SANITATION



This ranking focuses on universities' research related to water, their water usage, and their commitment to ensuring good water management in the wider community.

The University of Alberta water management initiatives are run through the Watego Water Management Plan and include water consumption tracking (including audits), water efficiency retrofits, innovative pilot technologies and more.

7 AFFORDABLE AND CLEAN ENERGY



This ranking focuses on universities' research related to energy, their energy use and policies, as well as their commitment to promoting energy efficiency in the wider community.

The University of Alberta energy management initiatives include developing the Envision Energy Reduction Master Plan, conducting GHG emission inventories, and reviewing data to identify areas of high energy waste.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



This ranking focuses on developing quality, reliable, sustainable and resilient infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.

The University of Alberta industry, innovation, and infrastructure initiative include pursuing green building certifications, campus resiliency projects, green technologies on campus, and more.

11 SUSTAINABLE CITIES AND COMMUNITIES



This ranking goes beyond sustainability as stewardship of resources, to examine the roles of universities in sustaining and preserving community heritage. Additional focus is placed on institutional research on sustainability.

The University of Alberta sustainable cities and communities initiatives include promoting sustainable commuting, prioritizing pedestrian access on campus, and building campus infrastructure to sustainable standards.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



This ranking focuses on the efficient use of resources and minimizing waste. Universities must play their part in ensuring that their consumption is minimized, especially where resources are not renewable.

The University of Alberta consumption-based initiatives include the Sustainable Food Working Group, Hazardous Materials Management Group, Freecycle, Zero Waste Plan, and a goal to divert 90% of waste from landfills.

13 CLIMATE ACTION



This ranking focuses on universities' efforts to combat climate change and its impacts, including strengthening the resilience and adaptive capacity of the university and surrounding community.

The University of Alberta climate action initiatives include participation in STARS, the Campus is a Living Lab, the Sustainability Plan, the GHG Emissions Reduction Plan, and local education programs on climate change.

15 LIFE ON LAND



This ranking explores universities' research on life on land and their education on and support for land ecosystems.

The University of Alberta life on land initiatives include our Indigenous Strategic Plan, Zero Waste Plan, and a policy to reduce plastic waste on campus. A focus is also placed on providing educational programs on ecosystems for local/national communities.

Aligning of Targets

To establish future goals and strategies, quantifiable targets from our current sustainability plans have been catalogued below. Aligning these targets helps to ensure greater efficiency and synergy between the different plans that are contributing to our low-carbon future. The table below provides a comprehensive and aligned overview of our existing sustainability targets.

Plan	Target
Envision Energy Reduction Master Plan (EERMP, 2022-2030)	Overall energy intensity 15% below 2019/20 levels, by 2030.
	2,500 kW renewable energy installed by 2030.
	495 kW alternative energy installed by 2030.
	350,000 GJe Total Energy Reduction from 2022 usage, by 2030.
	25,000 tonnes CO ₂ e reductions from 2022 levels, by 2030.
University of Alberta Zero Waste Plan (2022-2032)	Increase capture rate of organics to at least 50% (medium-term timeframe).
	Increase diversion rate to 90% (long-term timeframe).
	Reduce total waste generated per year to 1950 tonnes (50% reduction from 2005 reference point) (medium-term timeframe).

Plan	Target
University of Alberta Zero Waste Plan (2022-2032) (Continued)	Reduce total waste generated per year to 46 kg per weighted campus user (long-term timeframe).
	Increase diversion of construction, demolition, and renovation waste to 90% (medium-term timeframe).
Water Management Plan (2022/23)	Reduce associated GHG of heating domestic water and circulation by approximately 175 tonnes of carbon dioxide equivalent.

Current Progress

The full breadth of our current sustainability initiatives has helped to establish us as a national and global leader. The impact of our efforts is reflected in our performance on respected academic ranking systems including:

- Ranking 6th in 2023/24 on the Times Higher Education Impact Rankings.
- Ranking 28th globally in 2023/24 (out of 1395 institutions) in the QS Sustainability Rankings.
- Receiving AASHE STARS GOLD Certification in 2020. The University of Alberta has maintained GOLD status since 2017 and received our first certification (SILVER) in 2015.

This section of the report will outline our quantifiable progress in reducing our GHG emissions, detail our progress towards achieving our aligned targets, and will establish a baseline for future performance. The progress detailed below is a direct result of our current and past sustainability plans, which are summarized in Appendix A.



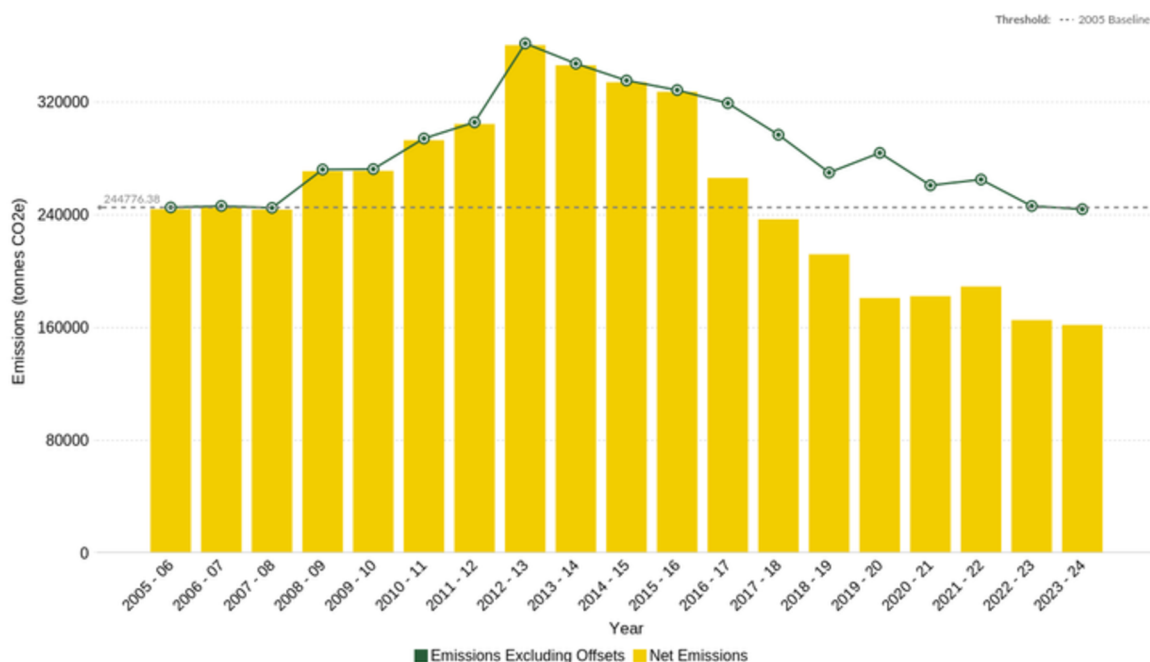
Summaries of the University of Alberta's progress in the following areas will be provided:

- GHG Emissions
- Energy
- Buildings
- Waste
- Transportation
- Water

The initiatives cited in the summaries (which contribute directly to our current progress) are available in further detail in the University of Alberta's Greenhouse Gas Reduction Plan (2005 to 2020). Furthermore, tracking of current progress data is available publicly on the University of Alberta Online Sustainability Dashboards.

Greenhouse Gas Emissions

The following data is taken directly from the University of Alberta's Sustainable Operations dashboard website. Key progress in the areas of greenhouse gas emissions, building energy use intensity, and green building space are provided below.



The figure above shows an overall decrease in GHG emissions over time since peak emissions in 2012/13.

In 2023/24, The University of Alberta emitted 243,506.06 tonnes of CO₂e (not including offsets), and 161,573.89 (tonnes CO₂e) including offsets, for a percent change of -33.7% from our reference point (2005). The energy management program has largely driven down operational GHG emissions for the University of Alberta. These gains have been achieved through building retrofits, asset optimization, and greening of the grid. This was achieved despite the increased growth of university building area (in square meters) by 75% since 1975/76.

The table below shows the Scope 1, 2 and 3 emissions as defined by the University of Alberta's GHG Inventory. Under TIER regulation (Alberta's industrial carbon pricing and emissions trading system) the university may be required to purchase offsets to meet provincial and federal limits.

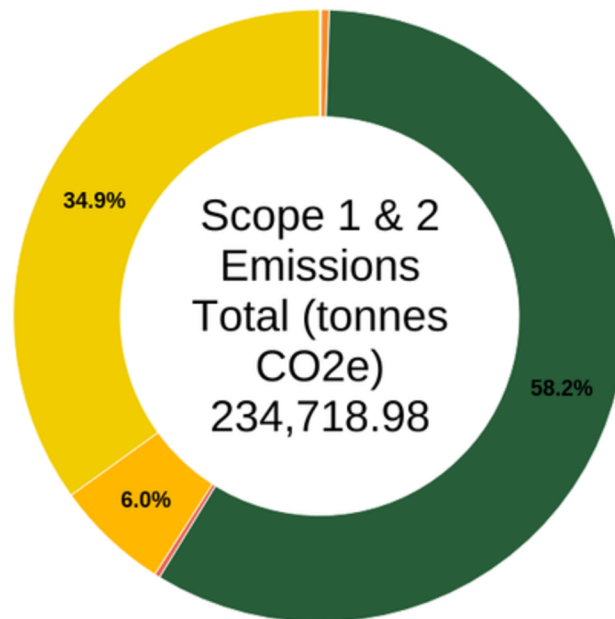
Scope 1	Scope 2	Scope 3
Heating Plant combustion processes Other on-campus stationary combustion Direct transportation Refrigerants and chemicals Agriculture	Purchased electricity	Scope 2 Transmission and Distribution (T&D) losses Solid waste Waste water Categories under consideration for future addition: <i>Air travel, student and staff commuting, paper use.</i>

Scope 3 emissions may prove challenging as they are often beyond an organization's control. The University of Alberta is mitigating these scopes through purchasing protocols (Green Certified whenever possible). Furthermore, means of moving beyond a traditional supply chain (such as circular economy platforms) are actively being pursued, and REC/carbon offset options are supported when booking air travel.

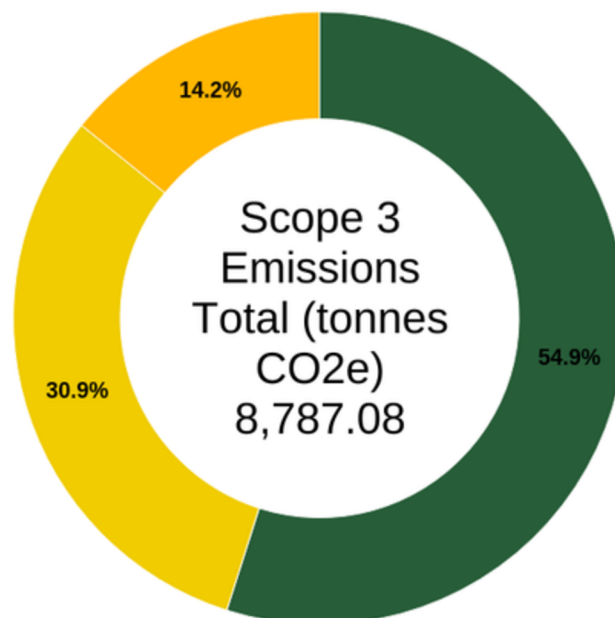
The University of Alberta will not shy away from this challenge, but like most conscientious organizations, we are in the research stage of discovering significant Scope 3 emissions reduction strategies. Additional areas being examined to reduce Scope 3 emissions include:

- CO₂ and CH₄ produced from decomposition in landfills. Current strategies include diverting organics from landfill and working upon existing partnerships with the City of Edmonton and its Anaerobic Digestion Facility.
- Mitigating GHG emissions associated with water treatment using strategies such as optimizing irrigation, reducing surface runoff, continuing the Watego Water Reduction Master Plan, and exploring options for greywater reuse.
- Scope 3 also includes losses during transmission and distribution of electricity. The emissions associated with these losses are included in this scope.

The figures below shows the The University of Alberta 2023-24 GHG emissions by scope.



Fertilizers	190.67	Livestock	16.69
Refrigerants/Halocarbons	991.21	District Energy System Fuel	136,705.47
Fleet Vehicle Fuel	675.86	Other Building Heating Fuel	14,126.90
Purchased Electricity	82,012.17		



Purchased Electricity Transmission Losses	4,824.25
Waste Water	2,718.39
Solid Waste	1,244.44

The diagram below provides a visual representation of the University of Alberta's District Energy System.

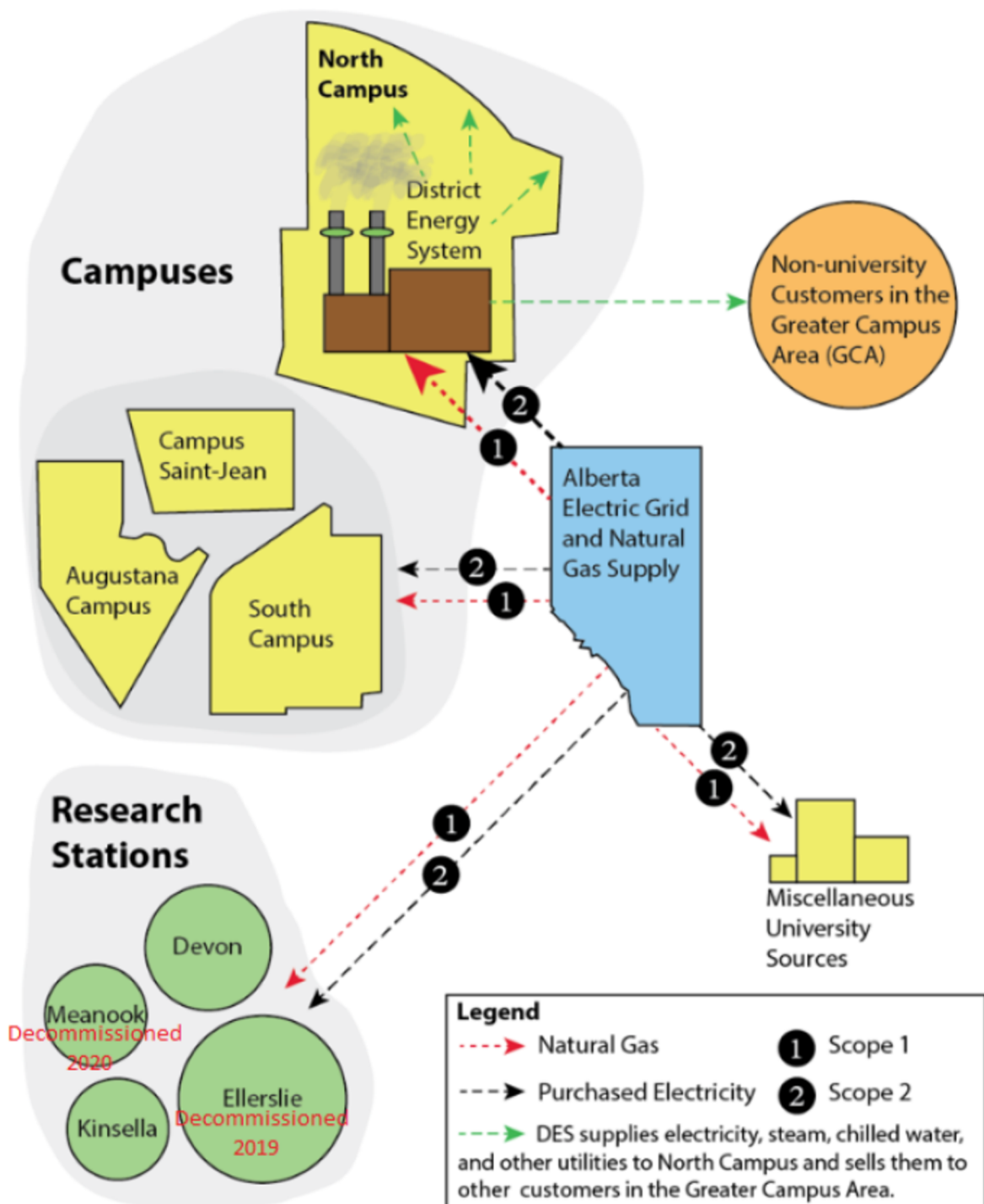
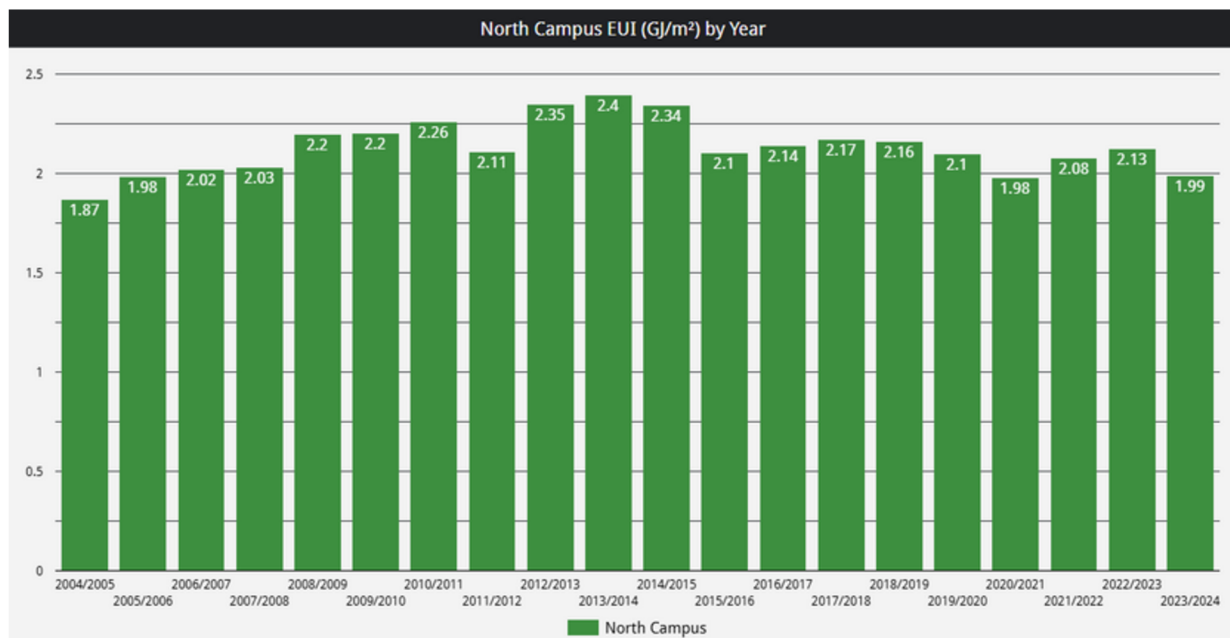


Figure 2-1. Illustration of the breakdown of major scope 1 and 2 emissions from U of A campuses and research stations. The DES supplies utilities to North Campus as well as customers in the greater campus area. North Campus is the source of 84.9% of the university's total emissions.

Energy Usage and Management

The figure below shows the North Campus Energy Use Intensity (GJ/m²) by year, showing a declining trend since its peak in 2013/14.



Energy Reduction Initiatives

The decline in energy use intensity was achieved due to energy reduction initiatives implemented by the University of Alberta. These initiatives are documented in the Energy Reduction Master Plan (2017) and are strategically phased to target higher priority and higher energy consuming areas such as laboratory buildings, and include the following efforts:

- Lighting retrofits
- Window replacements
- HVAC and mechanical room upgrades
- Demand-based laboratory ventilation, fume hood, and central system replacements.
- Installation of on-site renewable and alternative energy production
- Total facility renewals and envelope upgrades
- Deployment of Enterprise Energy Analytics

The University has also developed the Envision Energy Awareness Campaign to encourage energy conservation among individuals and the campus community. This effort is difficult to quantify but could result in 5-15% total GHG emissions reductions post-implementation.

University of Alberta Energy Reduction Initiatives - Phase Summary

Phase I - Completed in 2020. Energy savings of 79,000 GJe.

Phase II - Completed in 2020. Energy savings of 78,000 GJe.

Phase III - Completed. Energy savings of 75,000 GJe.

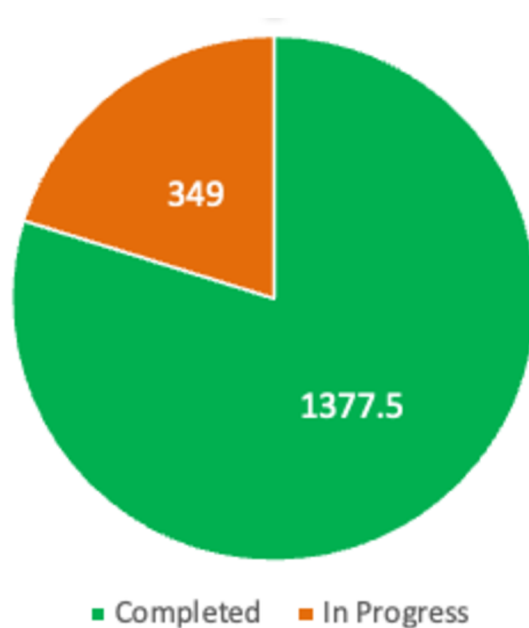
Phase IV and V - Completed in 2024. Energy savings of 135,000 GJe.

These initiatives will reduce GHG emissions by an estimated 30,000t of CO₂e. See the University of Alberta Greenhouse Gas Emissions Reduction Plan (2005-2020) for full details on the university's energy reduction initiatives.

Renewable and Alternative Energy

The University of Alberta has worked on installing increased solar PV, solar thermal, and alternative energy capacity throughout its campus. At present 146 kW of solar thermal capacity, 495 kW of alternative energy, and 1377.5 kW of solar PV capacity have been installed through the University of Alberta. The graph below represents this data. This increased energy capacity is expected to reduce GHG emissions by approximately 750t of CO₂e.

With an average number of 321 days and 2299 hours of bright sunshine each year in Edmonton the University of Alberta is uniquely positioned to integrate solar into its energy portfolio. Additional details on the projects within this initiative are available in the Envision Energy Reduction Master Plan.



The Campus as a Living Lab

Having access to world-class researchers and technology allows the University of Alberta to leverage our in-house knowledge of emerging and cutting-edge energy generation and sustainable technologies. The University of Alberta offers flexible microgrants (\$2000) as well as major grants (up to \$50,000) for larger projects, to internal and external research projects and leading-edge sustainability consultants. Taking advantage of the academic setting allows the university to explore, develop, and embrace emerging technologies, reduce our environmental impact, and cultivate a new generation of sustainably conscious students and leaders. Major projects already underway under this process include but are not limited to:

- PV Mapping of the North Campus (Faculty of Engineering)
- Installing Drip Irrigation Systems (Green & Gold Community Garden)
- Exploring Green Alternatives to Heated Water Baths (Faculty of Science)
- Eco-friendly management techniques of invasive tree species (Faculty of Science)
- Developing a University of Alberta Solar Garden Greenhouse (Faculty of Engineering)
- Developing a Sustainable Travel Behavior Toolkit (Faculty of Science)
- Wind Turbine Design Competitions (Renewable Energy Design Student Group)
- Water Recirculation to Cool Condensers R&D (Faculty of Science)
- FAB Gallery Lighting Replacements with LED (Faculty of Arts)
- 100 Debates on the Environment Public Discourse (Faculty of Arts)

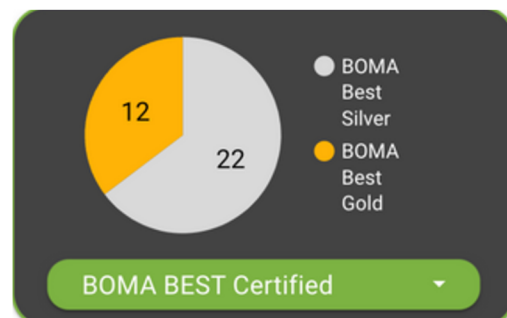
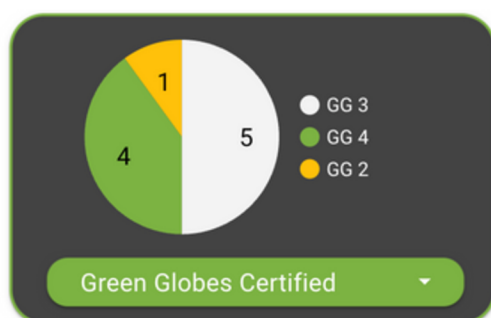
Green Labs

The University of Alberta operates an innovative program called Green Labs, which aims to educate lab operators on safe and sustainable lab practices, enable networking opportunities with like-minded colleagues, and provide options to participate in green lab initiatives. Several examples of Green Lab initiatives include:

- The Green Labs E-Class, a course for participants to learn more sustainable principles for lab settings.
- The Freecycle event (run biannually), which allow labs to donate their excess or unused lab supplies to other events helping to reduce waste and encourage reuse and networking.
- The ULT Freezer Energy Efficiency Rebates program offers rebates to labs which purchase energy efficient ultra-low temperature freezers.

Buildings and Infrastructure Management

The University of Alberta has reduced operational GHG emissions by constructing new buildings or retrofitting existing buildings to include more energy efficient building strategies, technologies and practices such as lighting retrofits (ex. LEDs), better thermally insulated building envelopes/windows, more efficient HVAC systems, and mechanical room upgrades. See below for a summary of the University of Alberta's green building certification achievements.



Building GHG Emission Reduction Initiatives

Buildings contribute to a number of operational emissions including energy and water usage, waste, and more. Our efforts in reducing building's operational GHG emissions contribute to the respective savings in each focus area. The university has achieved these savings partially through the following building efforts:

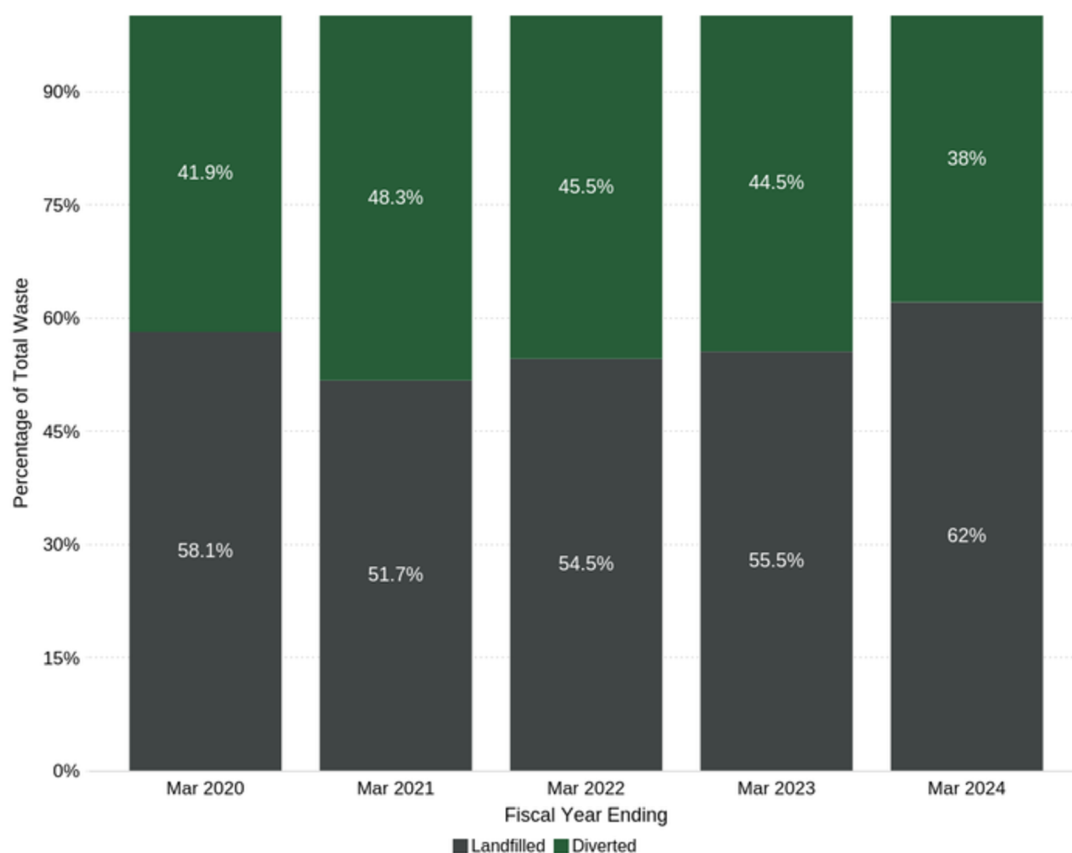
- All new construction is certified to at least LEED Silver, or under the Green Globes rating system.
- The Building Owners and Managers' Association (BOMA) Building Environmental Standards (BEST) program is used to certify the University of Alberta's existing building stock and inform opportunities to improve operations and maintenance.

See the University of Alberta Greenhouse Gas Emissions Reduction Plan (2005-2020) for full details on the university's building-related initiatives.

Waste Management and Diversion

As of March 2024, the University of Alberta achieved a waste diversion rate of **38%**. This was accomplished largely through the implementation of the Zero Waste program across 50 campus buildings. Due to circumstances beyond the university's control the diversion rate has seen a small downturn.

However, it is on an upward trajectory following the end of the COVID-19 pandemic. In addition, the University of Alberta diverts 1500 tonnes (75%) of organic waste annually, saving 1800t of CO₂e each year.

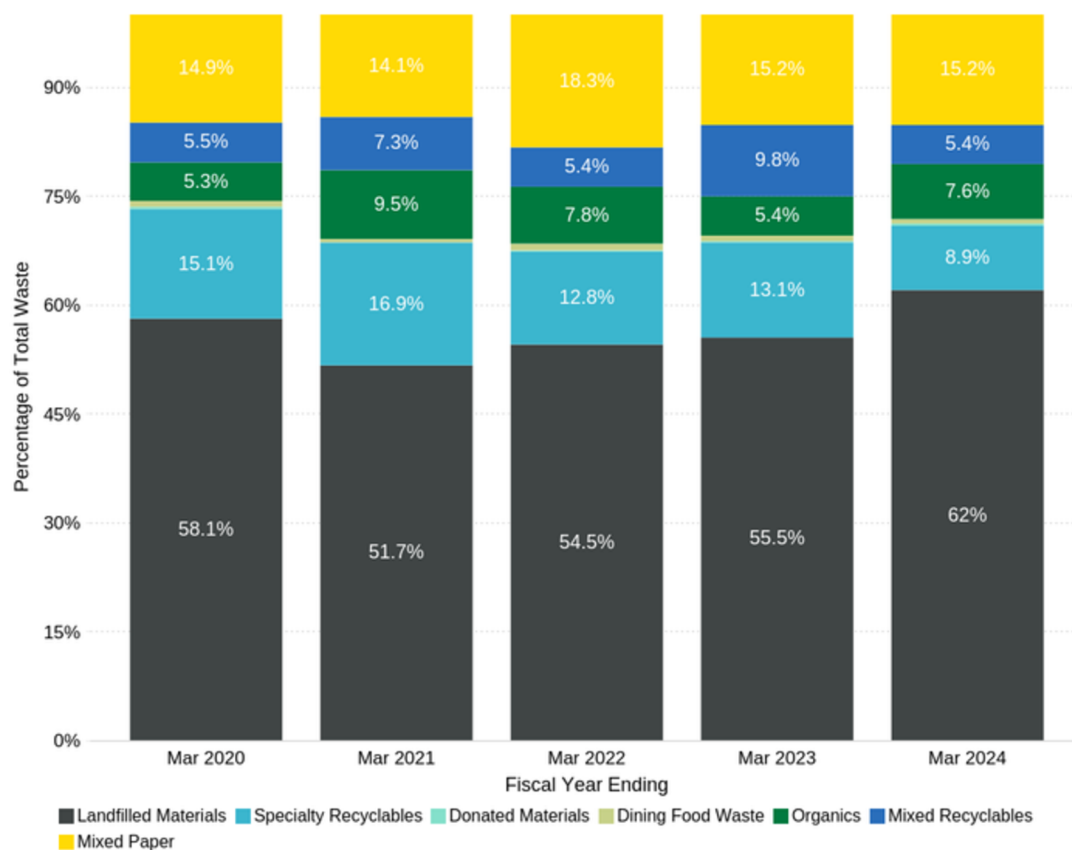


Waste Reduction Initiatives

The University of Alberta has been able to achieve success in waste diversion due to the following initiatives:

- The development of the Zero Waste Plan (2022-2032), with a long-term 90% waste diversion goal. See the Zero Waste Plan for the full details the university's all waste reduction initiatives.
- Regular waste audits to assess progress towards waste diversion goals.

- Outreach programs to reinforce recycling behaviours in the campus population.
- Developed a high solids anaerobic digestion facility (in partnership with the City of Edmonton) at the Edmonton Waste Management Centre.
- A waste diversion working group.
- Exploring a deconstruction policy and large-scale salvage/re-use initiatives for construction materials and surplus property.
- Providing reusable/compostable dishware/centralized collection stations.
- The Eco Move In/Move Out initiative.



Transportation Management

Reducing transportation emissions is challenging due to the unique transportation requirements of a high-level academic institution (such as commuting options for staff/students/faculty, conferences and research needs for faculty, and on-campus transportation options). To serve these needs, Built for Purpose: The University's Strategic Campus Plan (2025), sets an ambitious benchmark for the University of Alberta: a minimum of 65% total combined mode share across public transit, active transportation, and shared transportation. Therefore, our key challenge is to meet our transportation needs and benchmarks while also reducing our GHG emissions.

Transportation Emissions Reduction Initiatives

As such, the University of Alberta has chosen to focus on transportation aspects within our direct control. **The following initiatives have been implemented to reduce our GHG emissions associated with transportation:**

- The Universal Transit Pass (U-Pass); a joint initiative of the University of Alberta, the Student's Union, the Graduate Student's Association, and the local transit authorities to deliver affordable and sustainable transit to students.
- The operation of a Campus (North to Saint-Jean) shuttle.
- The commissioning of a transportation demand study (2014) to provide quality information for informing future initiatives and strategies. To be refreshed in 2025.
- The implementation of a car-sharing service for all members of the North Campus community in 2010.

The following initiatives are in progress to reduce our transportation GHG emissions:

- Annual fuel audits for university fleet vehicles. This information is then used to establish an annual baseline and develop plans to reduce future fuel usage.
- Replacing aging fleet vehicles with alternative fuel and power technologies.
- Examining and quantifying GHG emissions (Scope 3) associated with student and staff commuting. Developing a tracking mechanism for future GHG inventories.
- Implementing transportation demand management strategies to encourage more sustainable, low-carbon transportation among students, staff, and faculty.

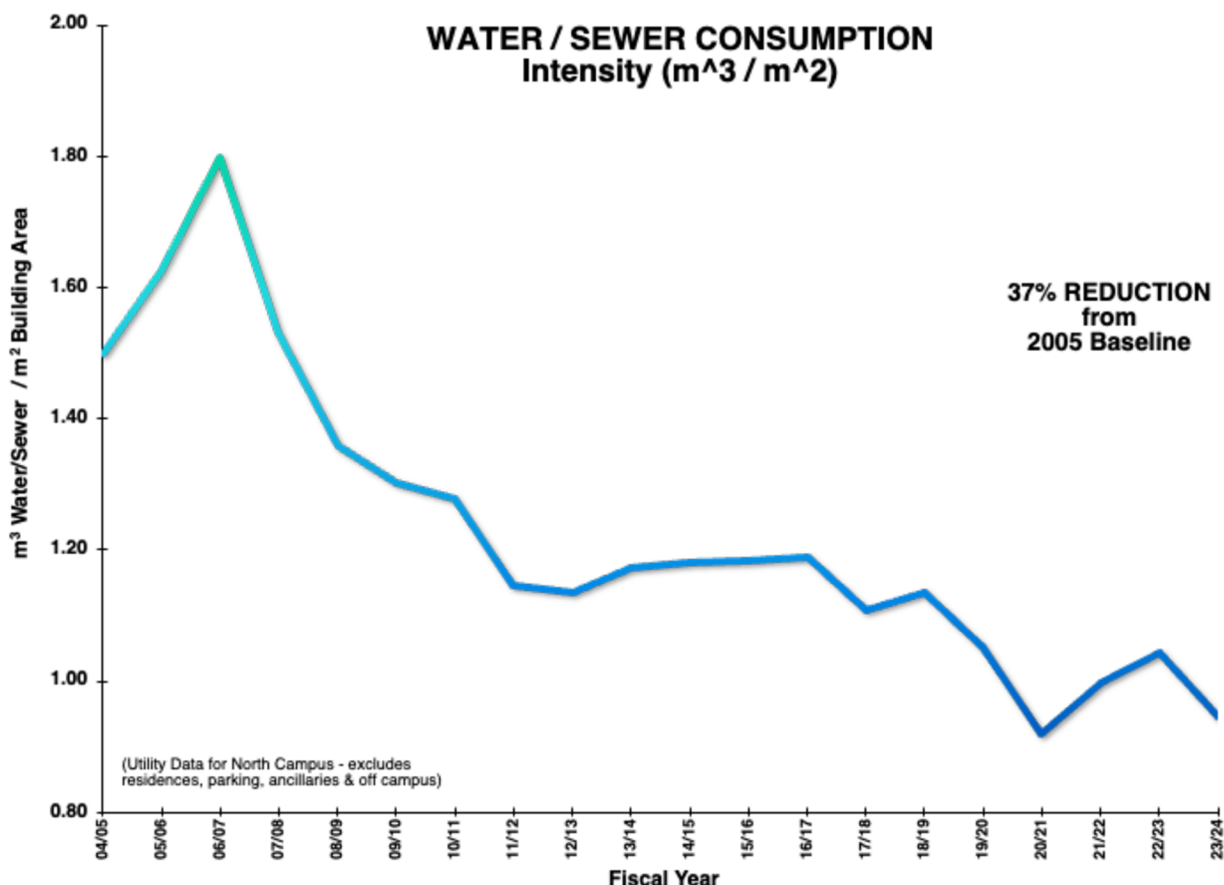
See the University of Alberta Greenhouse Gas Emissions Reduction Plan (2005-2020) for full details on the university's transportation emission reduction initiatives.

Water Conservation and Management

Between 1976-77 and 2023-24, the University of Alberta's water consumption has decreased by **60.35%**. Furthermore, water use intensity (the amount of water used per square meter of building space), decreased by **77%** between 1975-76 and 2023-24. Furthermore, the University of Alberta's water consumption has decreased **37%** from our reference point (2005).

These reductions were achieved despite a 75% increase in University building area (in meters squared) since 1975/76.

The water-energy nexus indicates that large quantities of energy are required to extract, purify, deliver, heat/cool, treat, and dispose of wastewater. As such, by reducing water usage and intensity significantly, the University of Alberta has taken meaningful steps towards reducing our overall energy usage and associated GHG emissions.



Water Conservation Initiatives

The University of Alberta performs continuous water audits for existing campus buildings through the BOMA BEST sustainability assessment and certification program, with the goal of identifying areas for improvement and implementing water conservation measures. At present, the initiatives outlined in our Watego Proactive Protection Plan (see below for details) have saved 34,945 m³ of water. Furthermore, our current plans project an additional 87,983 m³ of water savings available through future retrofit work on existing buildings.

Our water conservation efforts are facilitated by the University of Alberta's Watego Proactive Protection Plan. The plan's key initiatives include:

- Water metering installations and monitoring.
- Water audits for existing buildings.
- Retrofitting buildings with water-efficient fixtures (e.g. toilets, urinals, faucets) and equipment alternatives.
- Pilot innovations of new technologies.

See the University of Alberta Greenhouse Gas Emissions Reduction Plan (2005-2020) and the Watego Proactive Protection Plan for full details on the university's water conservation initiatives.

Future Strategies

Reducing our environmental impact is of paramount importance. As such, we've developed a pragmatic, technically-feasible plan to achieve a **35% reduction** in operational GHG emissions by 2050, compared to a 2020 baseline. Our current progress, along with our new approach, demonstrate our commitment to reducing our operational GHG emissions.

The table below provides an overview of the University of Alberta's operational GHG emissions reduction goals to 2050.

Milestone Dates (FY)	Operational GHG Emissions (tonnes of carbon dioxide equivalent)	Reduction from Baseline (%)	Target Operational GHG Emission Reductions ((tonnes of carbon dioxide equivalent)
2020	288,478		
2023	245,743	15%	42,735
2030	223,403	8%	22,340
2040	203,093	7%	20,310
2050	187,511	5%	15,582
Total	187,511	35%	100,967

Specific emphasis will be placed on addressing Scope 1 and 2 emissions, as they are the largest and most controllable source of GHG emissions for the University of Alberta.

High Level Overview: Emission Reduction Focus Areas

The table below provides a high level overview of the strategic focus areas of our operational GHG emissions reduction plan. These strategic focus areas will guide us on our journey to achieve our emission reduction goals.

Focus Area	Associated Plan	Sub-Strategies
Demand Reduction Strategies	Envision Energy Reduction Master Plan (EERMP, 2022-2030)	Retrofitting existing campus buildings.
		Reducing energy usage.
		Increasing energy efficiency.
		Operational/equipment/maintenance improvements, etc.
Supply Side Reduction Strategies	The Envision Energy Reduction Master Plan (EERMP, 2022-2030) and the MEP (Master Energy Plan)	Assumed continued greening of the Alberta energy grid.
		Increased investment in renewable and alternative energy capacity (e.g. solar installations).
		Updates to the District Energy System (DES) to provide additional energy efficiency and reduced GHG emissions via the MEP.
Asset Optimization		
Innovative Strategies		



The following pages break down the strategic focus areas into the specific initiatives that will be implemented to achieve our operational GHG emission reduction targets. These approaches include the continuation of existing, effective initiatives, as well as new innovations that are in line with the University of Alberta's position as a global leader in sustainability.

GHG Emission Reduction Focus Area One: Demand Reduction (EERMP) Strategies

Strategy	Strategy Details
Continue retrofitting existing buildings and drive high-performance guidelines for new construction.	• Continue driving high performance for building retrofits and new construction through green building certifications such as LEED, BOMA BEST, Green Globes. These strategies are supported through Built for Purpose: The University's Strategic Campus Plan (2025), the Integrated Asset Management Strategy (2024), and the Space Management Policy, which place a priority on the renewal and refurbishment of existing buildings. • Areas to address to improve building performance include: ◦ HVAC and mechanical room upgrades, building envelope upgrades (e.g. window replacements), refrigerant use (switch to optimal ODP and GWP refrigerants), incorporating/switching to LED lighting, demand-based laboratory ventilation, fume hood, and central system replacements, deployment of Enterprise Energy Analytics to identify areas of inefficiency and improvement.
Continue Watego proactive prevention plan to retrofit all existing buildings with water-efficient fixtures. Continue auditing all new and existing buildings.	• Install water efficient fixtures to the applicable buildings. There is a total possible savings of 87,983 m3, as of 2021. Focus on installing WaterSense and EnergyStar rated appliances. • Examine opportunities for non-potable water re-use (e.g. rainwater and greywater collection) to alleviate infrastructure burden and address the Water-Energy Nexus. • Examine alternatives to landscape irrigation requirements. Potential options include drip irrigation, using native or adaptive vegetation, greywater reuse, and using smart controllers.

GHG Emission Reduction Focus Area Two: Supply Side Reduction Strategies

Strategy	Strategy Details
Increase the University of Alberta's on-site alternative energy capacity.	- Continue installing renewable/alternative energy (e.g. PV, thermal wind, etc.) infrastructure throughout the campuses. Currently 349 kW of solar PV are in the process of being installed, with an additional 500 kW of solar PV being scoped for potential installation. - Perform audit of all campuses to determine additional areas for increased PV capacity. - Add Solar Capacity to existing sustainability dashboards for reporting and transparency.
Alberta Energy Grid Decarbonization	- As the Alberta energy grid supply is decarbonized, the operational GHG emissions of the University of Alberta will decrease over time. As of 2019, Alberta's electricity mix is 90% fossil fuel cased (natural gas and coal/coke). - No additional effort to receive these benefits is required by the University of Alberta. These passive gains will become apparent over time in the annual GHG accounting report.
Invest in off-site alternative energy.	Explore securing a power purchase agreement (PPA) with renewable/alternative energy producers (e.g. solar, wind). This allows for faster decarbonization of scope 2 electricity emissions compared to energy grid decarbonization efforts.

The University of Alberta has explored possibilities to guide the decarbonization of the District Energy System (DES). Several pathways have been examined and will be considered for future implementation. A high level overview of the pathways is provided below.

GHG Emission Reduction Focus Area Two: Supply Side Reduction Strategies

DES Decarbonization Pathway 1: Maintain Steam Service

Option	Option Overview
Option 1.1	This option involves modifying the DES to include a combination of steam, CHP (combined heat and power), and carbon capture technology.
Option 1.2	This option involves modifying the DES to include a combination of steam and hydrogen energy technology.
Option 1.3	This option involves modifying the DES to run on electricity instead of natural gas, including implementing electric steam boilers.

DES Decarbonization Pathway 2: Low Temperature Hot Water

Option	Option Overview
Option 2.1	This option involves modifying the DES to use Low Temp Water/Condensing Boilers with Carbon Capture.
Option 2.2	This option involves modifying the DES to use Low Temp Water, natural gas, and hydrogen boilers.
Option 2.3	This option involves modifying the DES to use Low Temp Water, and to run using electricity as a fuel source.

GHG Emission Reduction Focus Area Three: Additional Innovative Strategies

Strategy	Strategy Details
Continue replacing aging fleet vehicles with alternative fuel and power technologies.	• Develop a framework to track fleet vehicle replacements with renewable energy alternatives (e.g. electric vehicles). • Install appropriate numbers of alternative fuelling stations to support fleet vehicle transition.
Carpooling Promotion - Car Sharing Services	• Promote carpooling among the students/staff and offer incentives (e.g. discounted parking rates/tuition fees, preferred parking) to encourage participation. • Enter a contract to provide car-sharing services to students. Install necessary infrastructure to support, provide awareness, student population, and encourage participation.
Develop smart scheduling for courses.	Provide incentives for students to schedule courses on as few days as possible to limit commuting.
Establish a sustainable purchasing program.	Revise purchasing policy to include mandatory sustainability criteria (demonstrated reduced life cycle impacts) for all purchased products.

GHG Emission Reduction Focus Area Three: Additional Innovative Initiatives

Strategy	Strategy Details
Establish greater bicycling capacity on campus.	Develop goals and framework to establish increased bicycling capacity on campus. Invest in short- and long-term storage, network access, and shower facilities as required.
Knowledge Sharing	Coordinate with other universities/organizations to share and learn additional best practices. The University of Alberta has an opportunity to advance the entire academic field and have an impact far greater than just the operational emissions under our control.
Asset Optimization	University of Alberta to develop a comprehensive strategy for asset optimization.
Waste Reduction Efforts	• Continue the implementation of the Zero Waste Management Plan. • Waste reduction strategies include: ◦ Recycling materials to reduce landfill ◦ Diverting organics from landfill to reduce methane buildup, ◦ Examining partnerships with the City of Edmonton and its Anaerobic Digestion Facility.

GHG Emission Reduction Focus Area Four: Carbon Offsets

Strategy	Strategy Details
Carbon Offsets	Carbon offsets will be purchased annually as required for compliance, but will also be continually assessed and considered as markets and political landscapes change over time. Power Purchase Agreements (PPA) and RECs (Renewable Energy Certificates) will be examined for potential future implementation.

Monitoring and Evaluation

Monitoring progress is crucial to achieving our emission reduction goals. The following programs are already in place to help establish progress and adjust initiatives as needed.

Online Sustainability Dashboards

The University of Alberta maintains an online Sustainable Operations dashboard which provide updates on GHG emissions, energy and water consumption, and campus green building certification. This information is publicly available at the link below:

<https://www.ualberta.ca/facilities-operations/projects-initiatives/energy-climate-action/interactive-dashboards.html>

Furthermore, the University of Alberta is also working on a new google dashboard which, when complete, will provide a wider breadth and depth of campus sustainability information, all in real time.

Annual Reporting

The University of Alberta's Energy Management and Sustainable Operations group will update its GHG inventory on an annual basis. Annual reports will provide transparency and ensure sufficient progress towards our 2050 milestones and goals.

AASHE STARS

Every two to three years, the university submits a report to the Association for the Advancement of Sustainability in Higher Education (AASHE) through their Sustainability Tracking, Assessment & Rating System (STARS), which assists in further progress tracking as well as benchmarking and knowledge transfer with peer institutions. The University of Alberta currently holds GOLD certification in STARS, received in 2020.

Public Accountability

All annual reports will be made publicly available online. At the time of this plan, the location of these reports will be:

http://www.facilities.ualberta.ca/Operations_Maintenance/EMSO.aspx

Our performance, transparency, and accountability, will also be reflected in our public rankings on the QS Sustainability Rankings, the Times Higher Education Impact Rankings, and the Association for the Advancement of Sustainability in Higher Education (AASHE) Sustainability Tracking, Assessment & Rating System (STARS).

Challenges Ahead

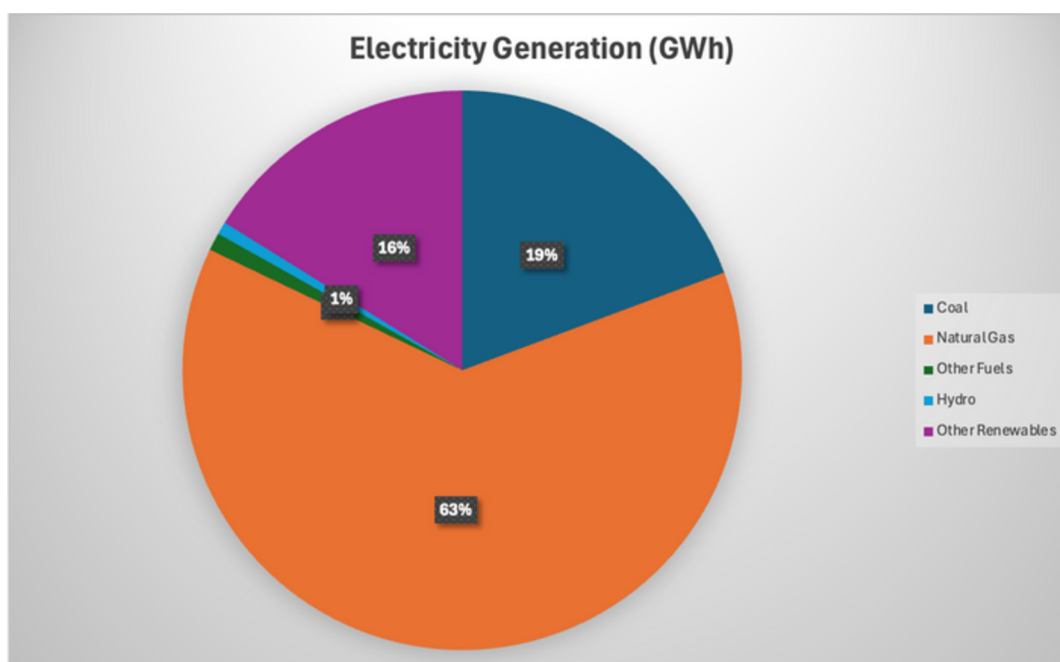
Successfully achieving a low-carbon future is an immense challenge. To achieve this goal, the University of Alberta will address a series of issues specific to our academic setting. These challenges have been identified and expanded on in the following section.

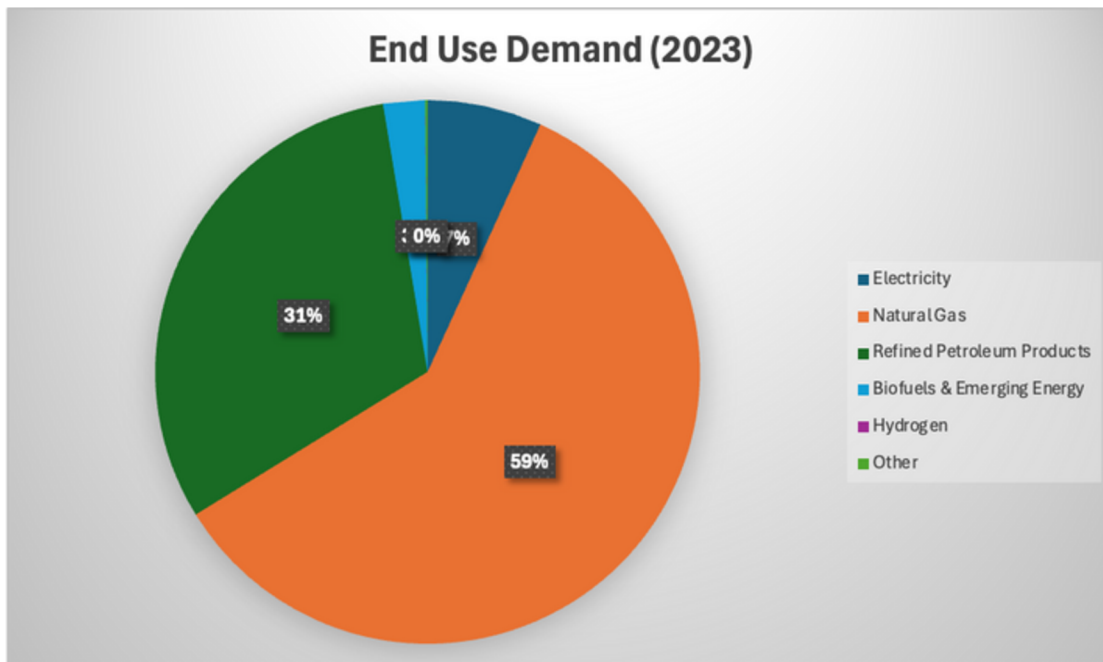
Geography and Climate

The University of Alberta is located in Edmonton, Alberta, which presents unique opportunities and challenges. Although the abundance of solar energy in the area allows for significant solar expansion, harsh winters with heavy snowfalls can cause problems with power reliability from renewable sources and incur additional maintenance problems (e.g. clearing snow off of PV panels).

Furthermore, very cold winters can necessitate greater heating requirements, thus creating a unique challenge for reducing GHG emissions. Passive heating techniques, building orientation, and good insulation will be required for new buildings to counteract these issues.

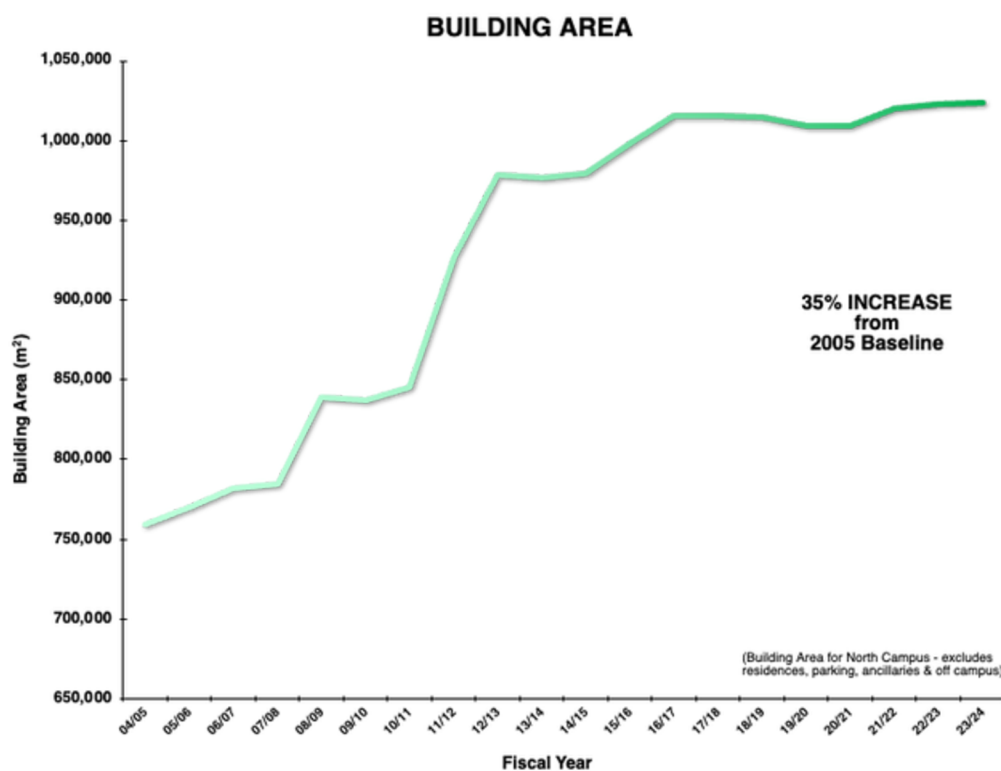
In addition, Alberta's 2022 electricity grid (see the figure below) and 2023 end-use demand (see figure on the next page) are currently dominated by natural gas and petroleum products. While this provides a lot of room for aggressive improvement, it also limits the control that the University has over energy supplied from the grid.





Accommodating Growth

The figure below displays the University of Alberta's infrastructure growth over time, in particular showing a 75% increase in University building area (in meters squared) since 1975/76, and a 35% increase from our reference point (2005). In addition, the University of Alberta student population is expected to grow to 60,000 by 2033.

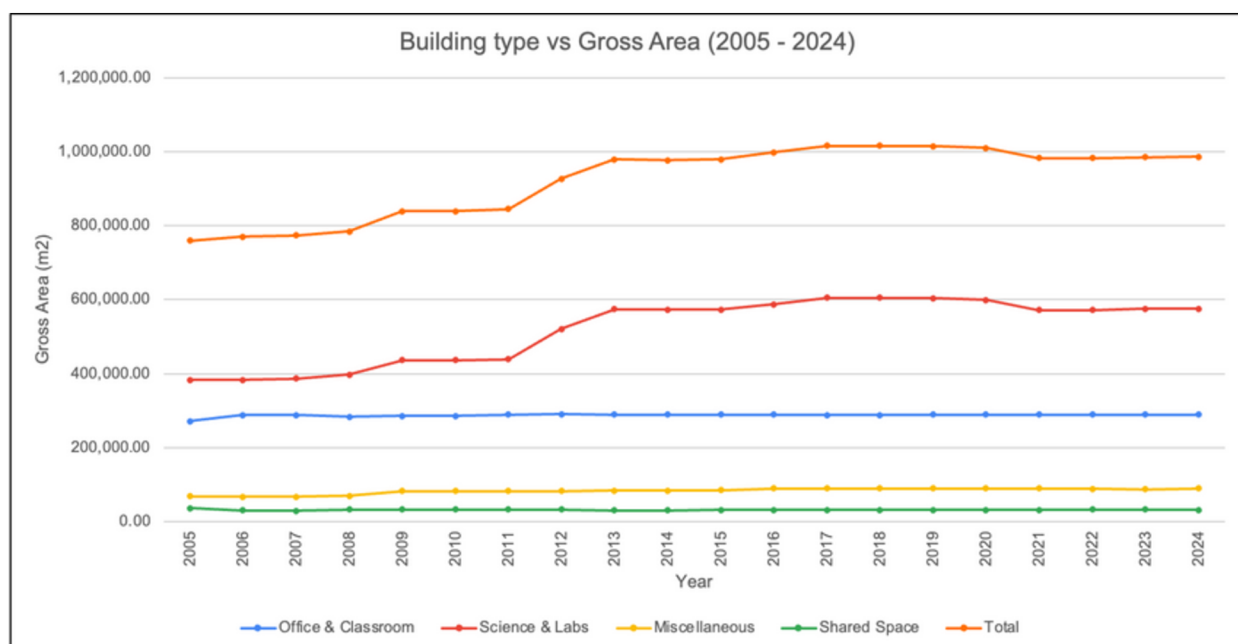


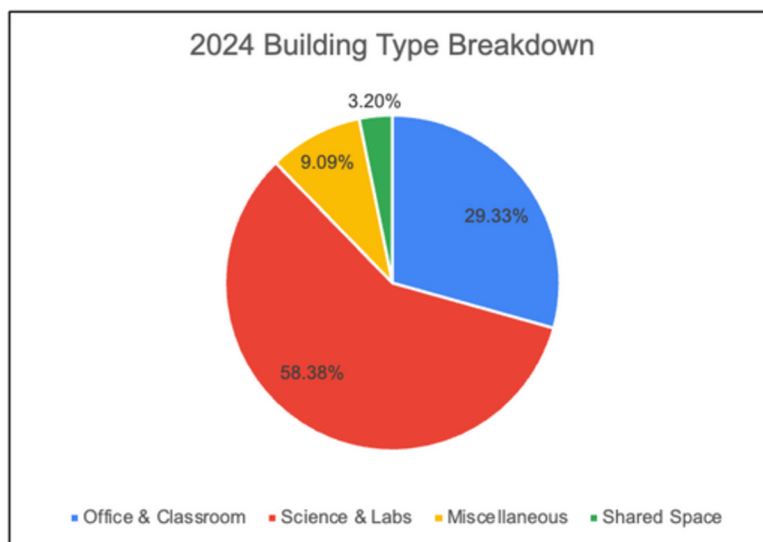
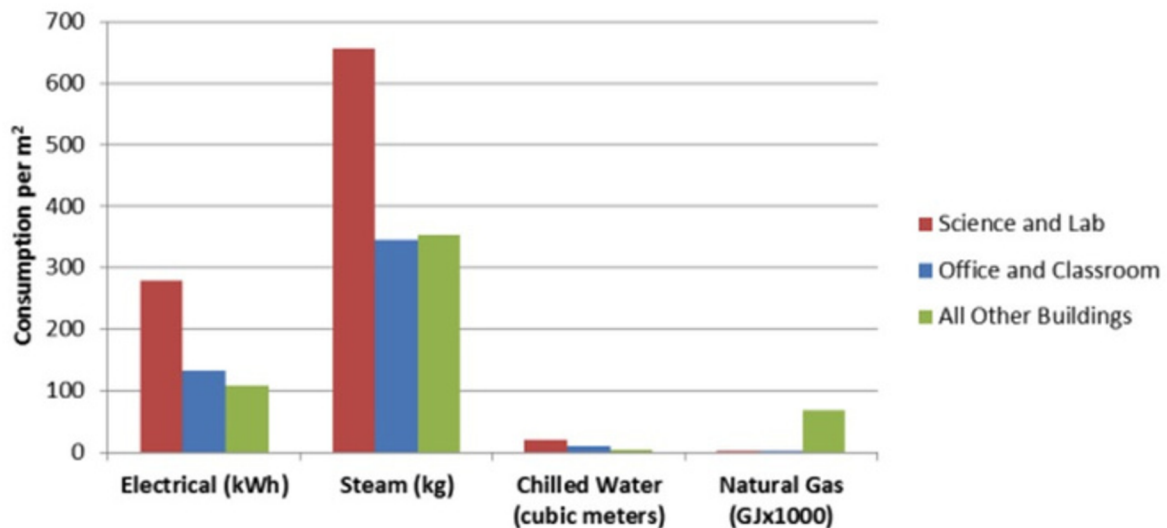
Our “Built for Purpose: The University’s Strategic Campus Plan” starts the conversation on how we can accommodate our student body growth within our existing campus footprint. Furthermore, new strategies and initiatives (including those described in the previous section) are being researched and implemented to ensure we can meet our organization’s current and future needs while also reducing our operational GHG emissions.

Resource Demands by Building Type

The figure below shows the University of Alberta building type by gross area from 2005 to 2024. As of 2024, Science and Labs account for 58.38% of the gross building area of the University of Alberta, growing by 50.37% from 2005 to 2024. These building types are energy intensive, consuming 2.5 times the amount of energy compared to an office/classroom (see the figure on the next page showing the utilities consumption of each space type from 2006 to 2012).

Thus, accommodating these infrastructure requirements represents a unique challenge for the academic setting. Through the “Built for Purpose: The University’s Strategic Campus Plan”, the University of Alberta aims to reduce the number of buildings containing high-service labs by consolidating them into designated areas, thereby helping to reduce unnecessary supporting infrastructure and reclaiming building area. Furthermore, the University of Alberta is continuing to research new strategies for reducing GHG emissions in these complex situations, while still providing high-quality learning space and opportunities for its students.





Increasing Energy Demands

Within an academic setting, increasing energy demands are continuously being placed on existing facilities with respect to occupancy and usage. Facilities are becoming increasingly more equipment laden, and often required to run for longer hours. At present, funds for upgrades are not keeping pace with the decay rate of facilities. As such, meeting the energy needs of the university, while also hitting the desired targets for GHG emission reductions, constitutes one of the greatest challenges for the University of Alberta.

Appendix A: Overview of Present & Past Plans

Yearly Academic Action Planning (by the Sustainability Council)

The Sustainability Council carries out yearly sustainability academic action planning, which is captured in its yearly annual report. The planning is largely focused on undergraduate and graduate offerings (programs/certificates/courses/internships, etc) and building partnerships, links and opportunities across disciplines and faculties.

Envision Energy Reduction Master Plan (EERMP 2022-2030)

This plan's main objective is to assist the University of Alberta in reducing our GHG emissions by an additional 25,000 tonnes of carbon dioxide equivalent by 2030 (from 2022) and position us as a leader in climate change mitigation. The plan outlines strategic focus areas (energy efficiency, building upon existing gains), summarizes existing progress and initiatives, and expands on current targets.

University of Alberta Zero Waste Plan (2022-2032)

This plan sets out goals, targets, and actions that will transition us toward a zero-waste vision. Critical strategies include the conservation of resources by means of responsible production, consumption, reuse/recovery of products, packaging, and materials. An ambitious target of 90% waste diversion was set. Including several specific sub-targets such as demolition waste and organic waste. The plan sets out past initiatives, current progress and context, and sets out pathways/targets for the future. The Zero Waste Plan was created in accordance with the Zero Waste Hierarchy defined by the Zero Waste International Alliance.

Indigenous Strategic Plan (2022)

With our Indigenous Strategic Plan, we have committed to intentionally gathering Indigenous community input into the formation of all policies. This includes examining ways to incorporate Indigenous cultural considerations and wisdom into sustainability and climate change mitigation goals.

Water Management Plan (2022/23)

Our Watego (a university wide water stewardship program) Water Management plan, was created to focus on water reduction within the broader field of sustainability at the University of Alberta. Watego's initiatives include: retrofitting older buildings with water-efficient fixtures and equipment alternatives (e.g. toilets, urinals, faucets), feasibility studies and water audits to identify water conservation opportunities, and identifying educational/research/behavioral opportunities.

Sustainability Plan (2016-2020)

The University of Alberta's Sustainability Plan is the institutional strategic guide to integrating sustainability as an integral part of the university's life. The plan addresses a variety of aspects of sustainability, including developing a GHG emissions reduction plan, developing new and existing sustainable buildings, diverting landfill waste, developing sustainable purchasing practices, investing in sustainability education, tracking progress, and more. The plan was designed to synergize with the STARS (Sustainability, Tracking, Assessment & Rating System) program.

University of Alberta Greenhouse Gas Emissions Inventory (2005-06 Baseline and 2023-24 Report)

The University of Alberta commissioned several GHG emissions inventory reports, with the most recent report covering 2023-24. These documents allow for better management of sustainability data, a higher level of accuracy, greater operational transparency, and most critically, a means of accurately reporting and tracking progress on achieving sustainability goals. These reports provide additional details on the scope covered, tracking protocols, scope definitions, and key information that is used to support the development of the plans/strategies.

University of Alberta Greenhouse Gas Emissions Reduction Plan (2005-2020)

A predecessor plan to the EERMP, this document provides an overview of the University's approach to reducing GHG emissions for the years 2005-2020. A GHG emissions inventory was first conducted to track historical and current emissions. Following this four reduction strategy areas (and associated targets) were identified: energy, buildings, solid waste, and transportation. A monitoring system was also developed to produce annual tracking reports and participate in AASHE's STARS program, in order to evaluate progress.

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