2024 GHG Emissions Inventory Summary
MacEwan University

Prepared for MacEwan University

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1.0 EXECUTIVE SUMMARY

This report presents energy and greenhouse gas (GHG) emissions for MacEwan University for Fiscal Year 2024 (April 1, 2023, through March 31, 2024) vs. previous years for the same 12-month period. Additionally, Fiscal Year 2014 is included as a reporting baseline. Emissions are calculated in accordance with the GHG Protocol[1].

Additionally, results are reported on a weather-normalized intensity basis to better reflect the performance of the buildings considering changing weather and new building developments.

Results per the GHG Protocol

Absolute GHG emissions were 27.9% lower in FY 2024 than in FY 2014.

FY 2014 – FY 2024 GHG Emissions

Scope / Source	Emissions (tCO_2e)			2024 vs. 2014 Increase (+) / Decrease (-)	
	FY 2014	FY 2023	FY 2024	Absolute	%
Scope 1 - Natural Gas, Fleet Fuel, Diesel Fuel	7,306	7,480	6,603	-703	-9.6%
Scope 2 - Electricity	17,300	11,162	11,133	-6,168	-35.7%
Total	24,606	18,642	17,736	-6,871	**-27.9%**

The total reduction in absolute emissions between FY 2014 and FY 2024 was primarily the result of reduced emissions intensity in the Alberta electricity grid. There was a decrease in total absolute emissions in FY 2024 relative to FY 2023.

Normalized GHG Intensity from Energy Use

After accounting for differences in weather and the changes in the campus gross floor area - the development of SAMU and Allard Hall and the divestment of the CFAC building - normalized emissions intensity from energy use was 22.8% lower in FY 2024 vs. FY 2014.

The CFAC building was sold in 2017. Therefore, its 2014 emissions are not included in the inventory per the GHG Protocol's Baseline Adjustment Policy.[2]

[1] The GHG Protocol – A Corporate Accounting and Reporting Standard (World Resources Institute, 2004).

[2] Appendix E - GHG Protocol Corporate Accounting and Reporting Standard (Revised Edition) - Base year recalculation methodologies for structural changes (World Resources Institute, 2005).

Fiscal Year GHG Emissions Intensity of Campus Buildings (Excludes Fleet Vehicles) - Normalized[3]

Year	GFA (m^2)	Energy (ekWh)	Emissions (tCO_2e)	Energy Intensity ($ekWh/m^2$)	Emissions Intensity (tCO_2e/m^2)
FY 2014 actual	156,441	61,421,689	24,547	392.62	0.157
Changes in grid emission factors	-	-	-5,629	-	-0.036
Changes in weather	-	-4,775,737	-853	-30.53	-0.005
FY 2014 normalized	156,441	56,645,952	18,066	362.09	0.115
FY 2024	198,879	58,008,096	17,736	291.68	0.089
FY 2024 vs. FY 2014 normalized:	42,438	1,362,144	-330	-70.42	-0.026
Percent Change:	27.1%	2.4%	-1.8%	-19.4%	**-22.8%**

A site-by-site breakdown of weather-normalized emissions can be found in Appendix C.

[3] Values are normalized by removing the impact of changes in weather and grid emissions intensity between FY 2014 and FY 2024 to better reflect performance with respect to utility use over time. Properties sold since FY 2014 have been removed from the baseline. Properties constructed since 2014 are included in the FY 2024 inventory. The emission factors used for normalized calculations are the 2022 grid intensities from Canada's National Inventory Report, published in 2024.

2.0 INVENTORY BOUNDARIES

2.1 Organizational Boundary

The organizational boundary for MacEwan University's GHG inventory is based on the operational control criteria as defined by the GHG Protocol:

> ***Operational Control.*** *A company has operational control over an operation if the former or one of its subsidiaries[4] has the full authority to introduce and implement its operating policies at the operation. This criterion is consistent with the current accounting and reporting practice of many companies that report on emissions from facilities, which they operate (i.e., for which they hold the operating license). It is expected that except in very rare circumstances, if the company or one of its subsidiaries is the operator of a facility, it will have the full authority to introduce and implement its operating policies and thus has operational control.*

The following buildings are included in the organizational boundary:

FY 2024 MacEwan University Buildings

Property Information			Scope 1	Scope 2	Totals		
Building Name	GFA (ft^2)	GFA (m^2)	tCO_2e	tCO_2e	tCO_2e	$kgCO_2e/ft^2$	$kgCO_2e/m^2$
Alberta College Campus	151,932	14,115	77	172	249	1.6	17.7
Allard Hall	405,105	37,635	708	1,851	2,559	6.3	68.0
Christenson Family Centre for S&W	128,856	11,971	507	928	1,435	11.1	119.8
City Centre Campus - 105 Street	156,782	14,565	760	901	1,660	10.6	114.0
City Centre Campus - 106 Street	247,863	23,027	1,229	2,096	3,325	13.4	144.4
City Centre Campus - 107 Street	282,499	26,245	1,443	2,329	3,772	13.4	143.7
Robbins Health Learning Centre	274,558	25,507	746	1,207	1,953	7.1	76.6
SAMU	51,697	4,803	157	338	495	9.6	103.1
Student Residence Building	363,304	33,752	692	720	1,413	3.9	41.9
University Service Centre	78,137	7,259	221	590	812	10.4	111.8
Overall Totals	2,140,733	198,879	6,540	11,133	17,673	8.3	88.9

2.1.1 Structural Changes

The organizational boundary of MacEwan University's 2024 GHG inventory was affected by the following structural changes.

1. The addition of Allard Hall in July 2017 and the Student's Association of MacEwan University (SAMU) building in November 2018. Since these are new development properties, no adjustment is made to prior historical years.
2. The divestment of Alberta College Campus in May 2023. This has resulted in a prorated adjustment of its area, historical energy and emissions data.

The approaches described above are consistent with the GHG Protocol.

[4] Chapter 3 - Table 1 - A Corporate Accounting and Reporting Standard (World Resources Institute, 2004).

2.2 Operational Boundary

This report includes Direct (Scope 1) and Energy Indirect (Scope 2) emissions at MacEwan University, as follows:

Emission Sources by Scope

Direct/Indirect	Scope	Emission Source	End Use
Direct	1	Natural Gas	Space heating, domestic water heating, cooking
Direct	1	Diesel Fuel	Stationary Sources - Back-up electricity generators
Direct	1	Vehicle Fuel	Mobile Sources - University operated vehicles
Energy Indirect	2	Electricity	Lighting, HVAC, space cooling, plug load, etc.

2.3 Exclusions

Scope 1 emissions are not reported for fugitive emissions from refrigerants used in facility refrigeration or air-conditioning units. Scope 3 emissions from waste disposal and fuel used by contracted maintenance operations or personal vehicles are also not reported.

2.4 2022 Fiscal Year Update

In 2022, MacEwan University changed its fiscal year for financial reporting. Up until FY 2021, the fiscal year ran from July 1 – June 30. Beginning in FY 2023, the fiscal year runs between April 1 – March 31 of the respective Fiscal Year. FY 2022 was a transition year and only included 9 months: July 1, 2021 to March 31, 2022.

Brightly has aligned the emissions reporting cycle with MacEwan University's fiscal year. To ensure reasonable year-over-year comparisons, both in the 'Per the GHG Protocol' results and the normalized results, the data for historical years is presented for the same 12-month period from April 1 – March 31.

3.0 QUANTIFICATION OF GHG EMISSIONS

In keeping with industry best practices, GHG emissions were quantified using the following formula for each GHG source identified in Section 2.2:

GHG Emissions = Activity Data (Consumption) * Emission Factor

3.1 Activity Data

The following subsections describe the sources of the activity data used.

3.1.1 Electricity

Electricity is purchased by MacEwan University from Capital Power via seven (7) metered electricity services as of March 31, 2024. One additional metered electricity service provided power to the Alberta College Campus building, which was divested in May 2023. Building level electricity consumption was obtained directly from the utility bills. Billed electricity consumption is detailed in Appendix A, as allocated to the buildings served.

3.1.2 Natural Gas

Natural gas is purchased by MacEwan University from Access Gas via six (6) metered natural gas services as of March 31, 2024. One natural gas meter serviced the Alberta College Campus building, which was divested in May 2023. Natural gas consumption was obtained directly from the utility bills. Billed natural gas consumption is detailed in Appendix A, as allocated to the buildings served.

3.1.3 Diesel Fuel

Diesel fuel is used for backup electricity generation. Total monthly fuel costs were provided by MacEwan University. Consumption was estimated based on the fuel costs and average fuel prices for each reported month. Calculated fuel consumption is detailed in Appendix A.

3.1.4 Fleet Fuel

Gasoline is consumed by university operated vehicles. Total monthly fuel costs were provided by MacEwan University. Consumption was estimated based on the fuel costs and average fuel prices for each reported month. Calculated fuel consumption is detailed in Appendix A.

3.2 GHG Emission Factors and Global Warming Potentials

The following table provides the Global Warming Potentials (GWPs) for the types of emissions reported.

Global Warming Potentials

Emission Type	GWP (gCO_2e/g)	Source
CO_2	1	Table 8.A.1 in Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change
CH_4	28	
N_2O	265	

The following table provides the GHG emissions factors used to calculate emissions for each source.

Building Energy: GHG Emission Factors with Sources

GHG Source	Emissions by GHG Type			Total Emission Factor	Unit	Factor Source
	gCO_2	gCH_4	gN_2O			
2014: Electricity	750	0.04	0.01	**760**	gCO_2e /kWh	National Inventory Report (1991-2022) Greenhouse Gas Sources and Sinks in Canada
≥ 2022: Electricity	470	0.08	0.01	**470**		
2014: Natural Gas	1,930	0.037	0.035	**1,941**	gCO_2e /m3	
≥ 2022: Natural Gas	1,962	0.037	0.035	**1,973**		
Diesel Fuel	2,681	0.051	0.220	**2,747**	gCO_2e /L	
Gasoline	2,307	0.140	0.022	**2,317**		

Note that, as per the GHG Protocol, the electricity emission factor used for scope 2 reporting does not account for emissions due to transmission and distribution losses.

3.2.1 Treatment of Scope 1 & 2 Emission Factors in Historical Years

Electricity emission factors vary over time as the generation mix throughout Alberta changes. Environment Canada publishes a 'National Inventory Report' (NIR) each year. The 2024 NIR, used in the preparation of this emission report, contains annual electricity emission factors reflecting the electricity generation mix in each year from 2000-2022. Emissions could be calculated in two ways:

Method 1: Using the 2024 NIR annual emission factors for the corresponding year for each year prior to 2022, and the 2022 emission factors to report 2023-2024 emissions.

Method 2: Using the 2022 emission factors for all years.

Method 1 is applied for all non-normalized emissions data. Normalized GHG emissions use Method 2, to ensure these results accurately reflect emissions reductions caused by changes to MacEwan University's operations.

4.0 GHG INVENTORY SUMMARY

4.1 Building Activity Data and Emissions

This section details the activity data and emissions resulting from building operations.

4.1.1 Activity Data

The following table summarizes the activity data for fiscal years 2014, 2023 and 2024:

Activity Data

Source	Consumption			2024 vs. 2014 Increase (+) / Decrease (-)	
	FY 2014	FY 2023	FY 2024	Absolute	%
Natural Gas (GJ)	139,318	140,710	123,691	-15,627	-11.2%
Electricity (kWh)	22,763,739	23,749,682	23,686,233	922,494	4.1%
Diesel Fuel (L)	10,369	8,672	15,235	4,866	46.9%
Gasoline (L)	13,261	6,694	8,961	-4,299	-32.4%

4.1.2 GHG Emissions: Performance Period vs. Base Year

The following table details GHG emissions for fiscal years 2014, 2023 and 2024, by emission source:

Emissions by Source (Non-Normalized)

Scope / Source	Emissions (tCO_2e)			2024 vs. 2014 Increase (+) / Decrease (-)	
	FY 2014	FY 2023	FY 2024	Absolute	%
Scope 1 - Natural Gas	7,247	7,440	6,540	-706	-9.7%
Scope 1 - Diesel Fuel	28	24	42	13	46.9%
Scope 1 - Fleet Gasoline	31	16	21	-10	-32.4%
Scope 2 - Electricity	17,300	11,162	11,133	-6,168	-35.7%
Total	24,606	18,642	17,736	-6,871	**-27.9%**

4.2 Data Certainty

The following table shows the level of certainty in the activity data and emission factors used in preparing this emissions inventory. Note that the combined emissions from natural gas and electricity account for over 99% of total emissions. As such, the overall level of certainty is considered high.

Certainty of Emissions Calculations by Emission Source

Emission Source	Certainty		Explanation
	Activity Data	Emission Factor	
Natural Gas	High	High	Consumption is measured via revenue grade meters by Direct Energy. The emission factor is published by Environment Canada.
Electricity	High	High	Consumption is measured via revenue grade meters by Enmax. The emission factor is published by Environment Canada.
Diesel and Gasoline	Medium	High	Consumption is estimated based on fuel costs and average annual fuel prices. The emission factor is published by Environment Canada.

APPENDIX A DETAILED ACTIVITY DATA

FY 2014 Energy Consumption by Building

Property Information			Electricity	Natural Gas	Totals		
Building Name	GFA (ft^2)	GFA (m^2)	kWh	ekWh	ekWh	ekWh/ft^2	ekWh/m^2
Alberta College Campus	151,932	14,115	338,527	498,441	836,968	5.5	59.3
Allard Hall	0	0	0	0	0	0.0	0.0
Christenson Family Centre for S&W	128,856	11,971	2,780,355	3,342,148	6,122,503	47.5	511.4
City Centre Campus - 105 Street	156,782	14,565	2,270,804	5,011,787	7,282,590	46.5	500.0
City Centre Campus - 106 Street	247,863	23,027	5,281,834	8,109,110	13,390,944	54.0	581.5
City Centre Campus - 107 Street	282,499	26,245	6,149,639	9,522,170	15,671,809	55.5	597.1
Robbins Health Learning Centre	274,558	25,507	2,949,976	5,818,593	8,768,569	31.9	343.8
SAMU	0	0	0	0	0	0.0	0.0
Student Residence Building	363,304	33,752	1,605,620	4,746,423	6,352,043	17.5	188.2
University Service Centre	78,137	7,259	1,386,985	1,609,278	2,996,262	38.3	412.8
Overall Totals	1,683,931	156,441	22,763,739	38,657,950	61,421,689	36.5	392.6

FY 2014 Energy Consumption by Building

Property Information			Electricity	Natural Gas	Totals		
Building Name	GFA (ft^2)	GFA (m^2)	kWh	ekWh	ekWh	ekWh/ft^2	ekWh/m^2
Alberta College Campus	151,932	14,115	351,677	502,329	854,005	5.6	60.5
Allard Hall	405,105	37,635	3,846,449	4,442,113	8,288,563	20.5	220.2
Christenson Family Centre for S&W	128,856	11,971	2,019,289	3,038,237	5,057,526	39.2	422.5
City Centre Campus - 105 Street	156,782	14,565	1,959,326	4,556,050	6,515,376	41.6	447.3
City Centre Campus - 106 Street	247,863	23,027	4,561,139	7,371,724	11,932,863	48.1	518.2
City Centre Campus - 107 Street	282,499	26,245	5,067,113	8,656,291	13,723,404	48.6	522.9
Robbins Health Learning Centre	274,558	25,507	2,521,133	4,331,047	6,852,180	25.0	268.6
SAMU	51,697	4,803	654,840	840,061	1,494,901	28.9	311.3
Student Residence Building	363,304	33,752	1,504,384	3,936,268	5,440,652	15.0	161.2
University Service Centre	78,137	7,259	1,264,333	1,370,166	2,634,498	33.7	362.9
Overall Totals	2,140,733	198,879	23,749,682	39,044,286	62,793,969	29.3	315.7

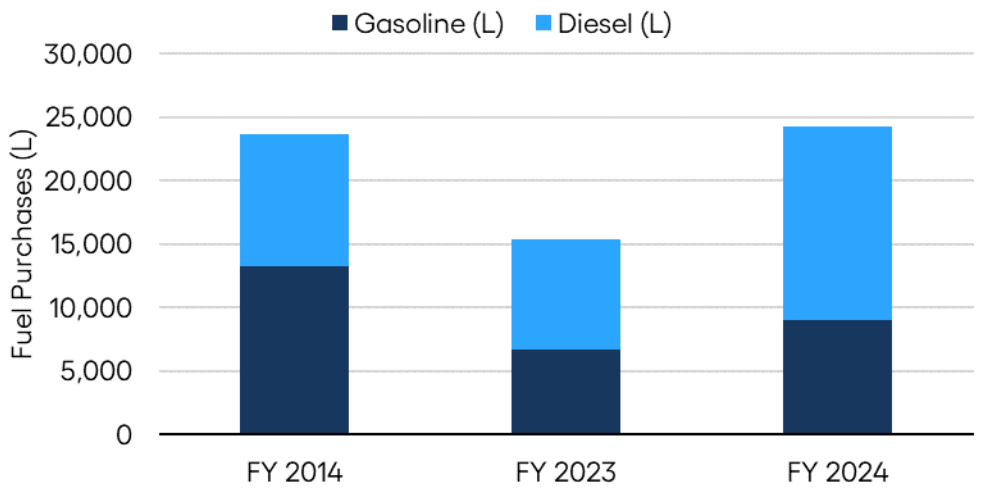
FY 2024 Energy Consumption by Building

Property Information			Electricity	Natural Gas	Totals		
Building Name	GFA (ft^2)	GFA (m^2)	kWh	ekWh	ekWh	ekWh/ft^2	ekWh/m^2
Alberta College Campus	151,932	14,115	365,870	406,406	772,277	5.1	54.7
Allard Hall	405,105	37,635	3,937,569	3,715,786	7,653,355	18.9	203.4
Christenson Family Centre for S&W	128,856	11,971	1,974,718	2,657,976	4,632,694	36.0	387.0
City Centre Campus - 105 Street	156,782	14,565	1,916,079	3,985,822	5,901,901	37.6	405.2
City Centre Campus - 106 Street	247,863	23,027	4,460,463	6,449,092	10,909,555	44.0	473.8
City Centre Campus - 107 Street	282,499	26,245	4,955,268	7,572,884	12,528,153	44.3	477.4
Robbins Health Learning Centre	274,558	25,507	2,568,077	3,915,487	6,483,563	23.6	254.2
SAMU	51,697	4,803	718,920	824,314	1,543,234	29.9	321.3
Student Residence Building	363,304	33,752	1,532,892	3,633,310	5,166,202	14.2	153.1
University Service Centre	78,137	7,259	1,256,376	1,160,785	2,417,161	30.9	333.0
Overall Totals	2,140,733	198,879	23,686,233	34,321,863	58,008,096	27.1	291.7

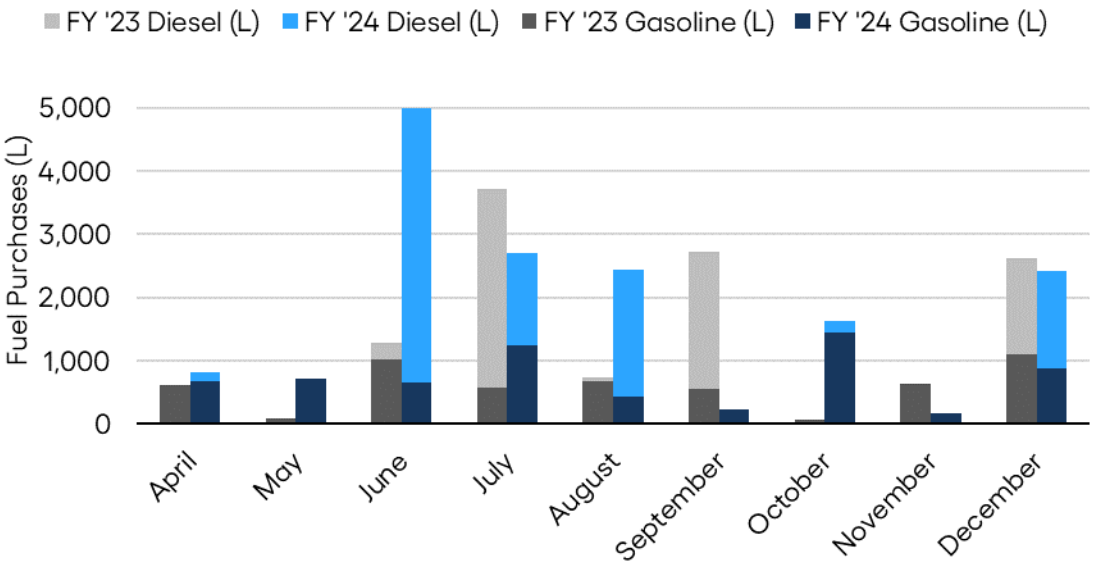
Estimated Fuel Consumption

Year	Total Cost		Average Purchase Price (¢/L)		Consumption (L)	
	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline
FY 2014	$12,748	$14,683	122.9	110.7	10,369	13,261
FY 2023	$15,077	$9,893	173.9	147.8	8,672	6,694
FY 2024	$21,924	$12,160	143.9	135.7	15,235	8,961

Total Fuel Volume Purchased



Total Fuel Volume Purchased by Month



APPENDIX B DETAILED EMISSIONS DATA

FY 2014 Emissions by Building

Property Information			Scope 1	Scope 2	Totals		
Building Name	GFA (ft^2)	GFA (m^2)	tCO_2e	tCO_2e	tCO_2e	$kgCO_2e/ft^2$	$kgCO_2e/m^2$
Alberta College Campus	151,932	14,115	93	257	351	2.3	24.8
Christenson Family Centre for S&W	128,856	11,971	627	2,113	2,740	21.3	228.9
City Centre Campus - 105 Street	156,782	14,565	940	1,726	2,665	17.0	183.0
City Centre Campus - 106 Street	247,863	23,027	1,520	4,014	5,534	22.3	240.3
City Centre Campus - 107 Street	282,499	26,245	1,785	4,674	6,459	22.9	246.1
Robbins Health Learning Centre	274,558	25,507	1,091	2,242	3,333	12.1	130.7
Student Residence Building	363,304	33,752	890	1,220	2,110	5.8	62.5
University Service Centre	78,137	7,259	302	1,054	1,356	17.4	186.8
Overall Totals	1,683,931	156,441	7,247	17,300	24,547	14.6	156.9

FY 2023 Emissions by Building

Property Information			Scope 1	Scope 2	Totals		
Building Name	GFA (ft^2)	GFA (m^2)	tCO_2e	tCO_2e	tCO_2e	$kgCO_2e/ft^2$	$kgCO_2e/m^2$
Alberta College Campus	151,932	14,115	96	165	261	1.7	18.5
Allard Hall	405,105	37,635	847	1,808	2,654	6.6	70.5
Christenson Family Centre for S&W	128,856	11,971	579	949	1,528	11.9	127.6
City Centre Campus - 105 Street	156,782	14,565	868	921	1,789	11.4	122.8
City Centre Campus - 106 Street	247,863	23,027	1,405	2,144	3,549	14.3	154.1
City Centre Campus - 107 Street	282,499	26,245	1,650	2,382	4,031	14.3	153.6
Robbins Health Learning Centre	274,558	25,507	825	1,185	2,010	7.3	78.8
SAMU	51,697	4,803	160	308	468	9.1	97.4
Student Residence Building	363,304	33,752	750	707	1,457	4.0	43.2
University Service Centre	78,137	7,259	261	594	855	10.9	117.8
Overall Totals	2,140,733	198,879	7,440	11,162	18,603	8.7	93.5

FY 2024 Emissions by Building

Property Information			Scope 1	Scope 2	Totals		
Building Name	GFA (ft^2)	GFA (m^2)	tCO_2e	tCO_2e	tCO_2e	$kgCO_2e/ft^2$	$kgCO_2e/m^2$
Alberta College Campus	151,932	14,115	77	172	249	1.6	17.7
Allard Hall	405,105	37,635	708	1,851	2,559	6.3	68.0
Christenson Family Centre for S&W	128,856	11,971	507	928	1,435	11.1	119.8
City Centre Campus - 105 Street	156,782	14,565	760	901	1,660	10.6	114.0
City Centre Campus - 106 Street	247,863	23,027	1,229	2,096	3,325	13.4	144.4
City Centre Campus - 107 Street	282,499	26,245	1,443	2,329	3,772	13.4	143.7
Robbins Health Learning Centre	274,558	25,507	746	1,207	1,953	7.1	76.6
SAMU	51,697	4,803	157	338	495	9.6	103.1
Student Residence Building	363,304	33,752	692	720	1,413	3.9	41.9
University Service Centre	78,137	7,259	221	590	812	10.4	111.8
Overall Totals	2,140,733	198,879	6,540	11,133	17,673	8.3	88.9

Emissions from Fuel

Year	Emissions (tCO_2e)			% of Total Emissions
	Stationary Diesel	Fleet Gasoline	Total	
FY 2014	28.5	30.7	59.2	0.33%
FY 2023	23.8	15.5	39.3	0.21%
FY 2024	41.9	20.8	62.6	0.35%

APPENDIX C WEATHER NORMALIZED ENERGY AND EMISSIONS BY BUILDING

To better understand how each building has performed with respect to utility consumption, energy and emissions for FY 2014 and FY 2023 are normalized to reflect FY 2024 weather conditions.

As part of this normalization process, linear regression models are developed for both historical years for each individual utility account consumption as a function of heating degree hours (for accounts providing heating energy) and cooling degree hours (for accounts providing cooling energy) using hourly weather data from Environment Canada.

The FY 2014 and FY 2023 models are applied to FY 2024 weather data to calculate, in effect, what consumption in historical years *would have been* had they experienced FY 2024 weather.

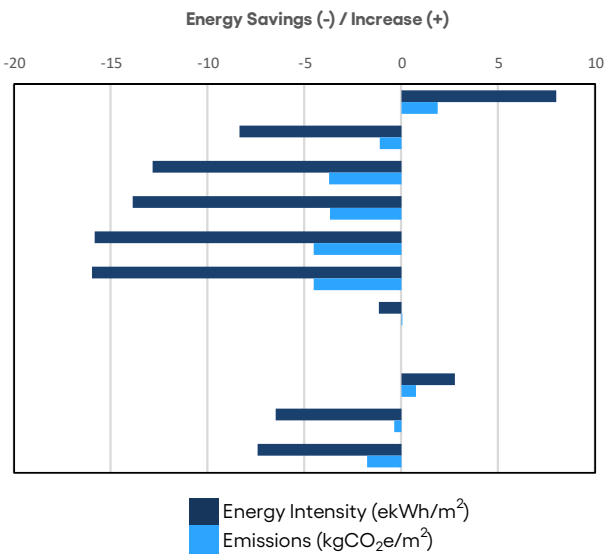
The following tables show FY 2024 energy and emissions intensity vs. FY 2023 and FY 2014, normalized for differences in weather.

Note that in some cases, emissions may increase despite energy savings, or vice versa. This occurs where a property achieves heating fuel savings but uses more electricity. Since electricity in Alberta is more carbon intensive per equivalent kWh (ekWh) than heating fuel (natural gas), there is sometimes a net increase in emissions.

Overall, under normalized conditions, MacEwan University had a decreased energy intensity of 7.40 ekWh/m^2 (-2.5%) and a decreased emission intensity of 1.76 kgCO_2/m^2 (-2.0%) when compared to FY 2023. These results are for campus buildings only and exclusive of fleet fuel use.

Change in Weather Normalized Energy and Emissions Intensity: FY 2024 vs FY 2023

Address	GFA (m^2)	Increase (+) / Decrease (-)	
		ekWh/m^2	kgCO2e /m^2
Alberta College Campus	14,115	8.0	1.9
Allard Hall	37,635	-8.4	-1.1
Christenson Family Centre	11,971	-12.8	-3.7
City Centre Campus - 105 Street	14,565	-13.9	-3.7
City Centre Campus - 106 Street	23,027	-15.8	-4.5
City Centre Campus - 107 Street	26,245	-16.0	-4.5
Robbins Health Learning Centre	25,507	-1.2	0.0
SAMU	4,803	24.1	8.3
Student Residence Building	33,752	2.8	0.7
University Service Centre	7,259	-6.5	-0.4
Total	**194,076**	**-7.40**	**-1.76**



Change in Weather Normalized Energy and Emissions Intensity FY 2024 vs FY 2014

Address	GFA (m^2)	Increase (+) / Decrease (-)	
		ekWh/m^2	kgCO2e /m^2
Alberta College Campus	14,115	-7.7	-2.6
Christenson Family Centre	11,971	-88.8	-35.9
City Centre Campus - 105 Street	14,565	-50.7	-16.6
City Centre Campus - 106 Street	23,027	-62.8	-22.1
City Centre Campus - 107 Street	26,245	-73.4	-26.9
Robbins Health Learning Centre	25,507	-67.2	-18.0
Student Residence Building	33,752	-15.0	-3.5
University Service Centre	7,259	-45.9	-13.0
Total*	**156,441**	**-50.1**	**-16.6**

*SAMU and Allard Hall are omitted since they were constructed after the FY 2014 period.