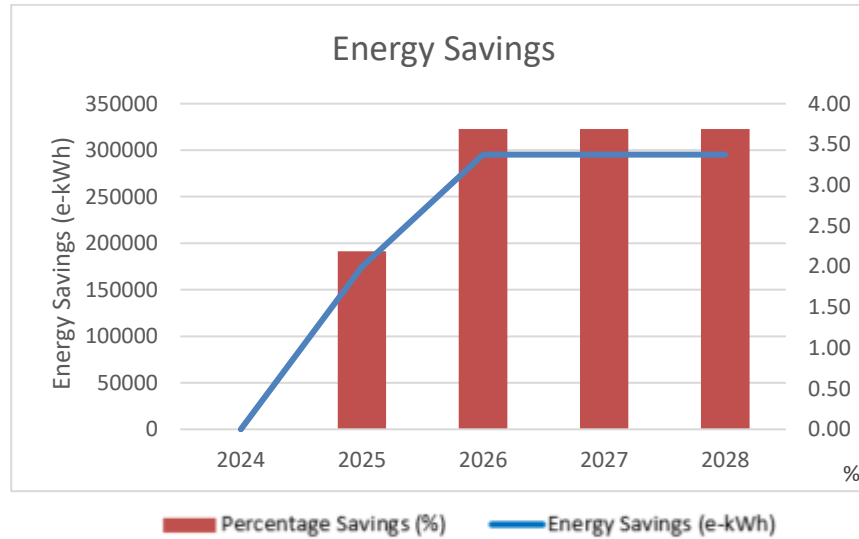


7.5 ESTIMATED SAVINGS

At the end of the plan, **Fire Stations and Emergency Services** are expected to save 3.69% over the base year of 2023

Figure 7-6: Energy Measure Annual Savings for Fire Stations and Emergency Services



starting 2024 will be adjusted to match the weather and occupancy of 2023. The figures below show the updated progress for each year against the set target.

7.6 PROGRESS TO TARGETS

The City is targeting a 3.69% reduction in energy use in **Fire Stations and Emergency Services** by 2028 over the base year, 2023. The reporting of energy consumption data and savings for **Fire Stations and Emergency Services** will be based on utility meters and assembled annually. Since utility meters monitor energy consumption for the entire facility, the measurement boundary will encompass all parts of the facility. To determine the savings and fairly compare year-to-year energy consumption data, it is important to account for independent variables such as weather and occupancy and apply regression analysis to consumption data. Therefore, actual consumption data for each year

8.0 GOLF COURSES AND ASSOCIATED FACILITIES

8.1 SCOPE AND BOUNDARY

Golf Courses and Associated Facilities include facilities that consist primarily of the following operations:

- Clubhouse
- Maintenance Shed
- Golf Course

For the purposes of this report, the City of Mississauga has 6 facilities/locations that fall under this category. They include:

- BraeBen Academy
- BraeBen Golf Course
- BraeBen Golf Course Maintenance Shed
- Lakeview Golf Course
- Lakeview Golf Course Open Pond
- Lakeview Greenskeeper

The above listed locations have a total floor area of approximately 4,800 square meters. This would account for 1.0% of the total building area for City of Mississauga facilities included in this Plan.

8.2 BASELINE

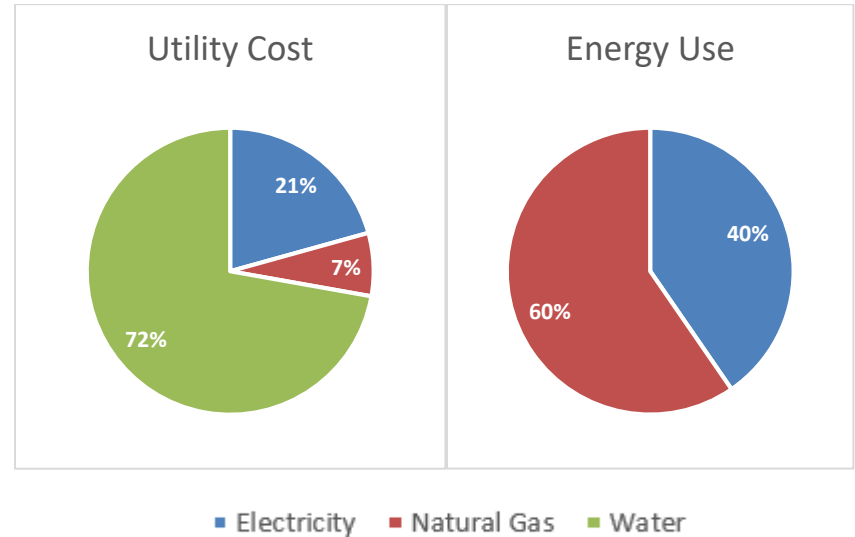
8.2.1 ENERGY USE

The energy use (combined electricity and natural gas) for **Golf Courses and Associated Facilities** was 1,357,682 equivalent kilowatt hours in 2023. Following are the key takeaways for the energy usage in 2023:

- 40% of the total energy usage was due to electricity use
- 60% of the total energy usage was due to natural gas use
- A total of \$423,000 in utility costs was incurred, out of which 21% is attributed to electricity, 7% to natural gas, and 72% to water

Golf Courses and Associated Facilities accounted for 2.1% of the City's total utility budget for 2023.

Figure 8-1: Utility Costs and Energy Use Breakdown for Golf Courses and Associated Facilities



8.2.2 ENERGY USE INTENSITY

Energy Use Intensity (EUI) is a measurement that expresses a building's energy use as a function of its size or other characteristic. It is used to give a better picture of the energy efficiency of a facility. The lower the EUI, the more efficient the facility is.

When reviewing EUI, the facility operation type and hours should be taken into account. For example, a facility that operates 24 hours a day will most likely have a higher EUI than a similar one that operates 8 hours a day. Similarly, a facility that has high energy using systems that do not contribute to the building area, such as an outdoor pool or outdoor ice rink, will have a higher EUI than a facility where those systems are

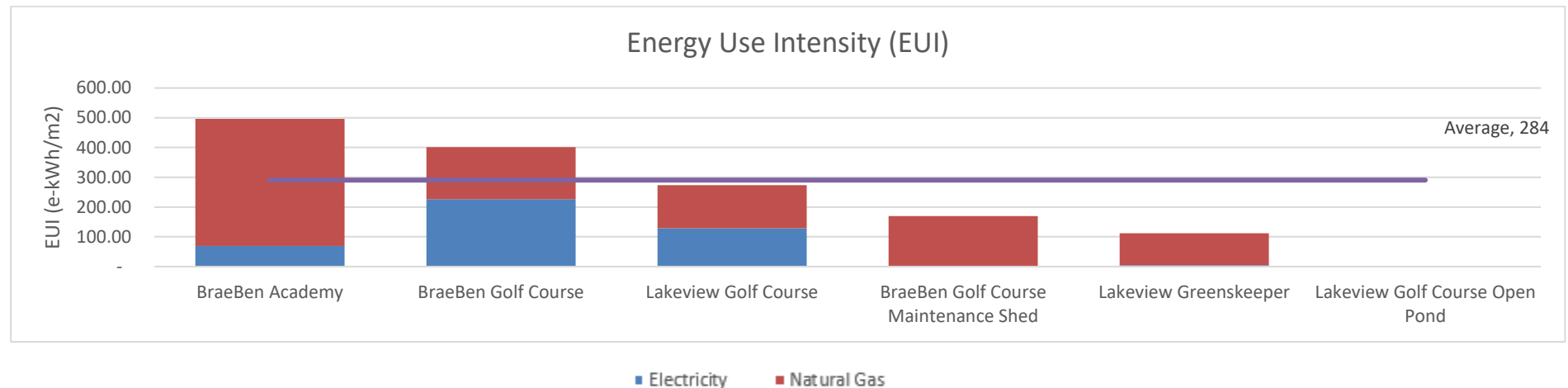
located within the facility, as they would add to the facility's area footprint.

For **Golf Courses and Associated Facilities** the average EUI in 2023 was 284 e-kWh/m²

The following chart shows the EUI for each facility within **Golf Courses and Associated Facilities**, and compares it to the average for the group.

Note: The Average EUI value is calculated by taking the total energy use of all facilities, and dividing by the total area of the facilities. As such, a larger facility would have a bigger impact on the average than a smaller facility.

Figure 8-2: Energy Use Intensity for Golf Courses and Associated Facilities

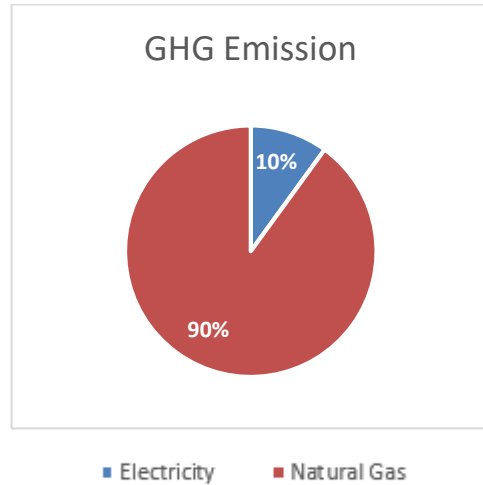


8.2.3 GREENHOUSE GAS (GHG) EMISSIONS

For 2023 **Golf Courses and Associated Facilities** emitted 164,500 kg (or 164.5 tonnes) of CO₂ in 2023. 10.0% of these emissions were due to the generation of electricity, while the use of natural gas accounted for the remaining 90.0%.

Golf Courses and Associated Facilities accounted for 0.8% of the City's total GHG emissions for facilities included in the plan.

Figure 8-3: GHG Emissions Breakdown for Golf Courses and Associated Facilities

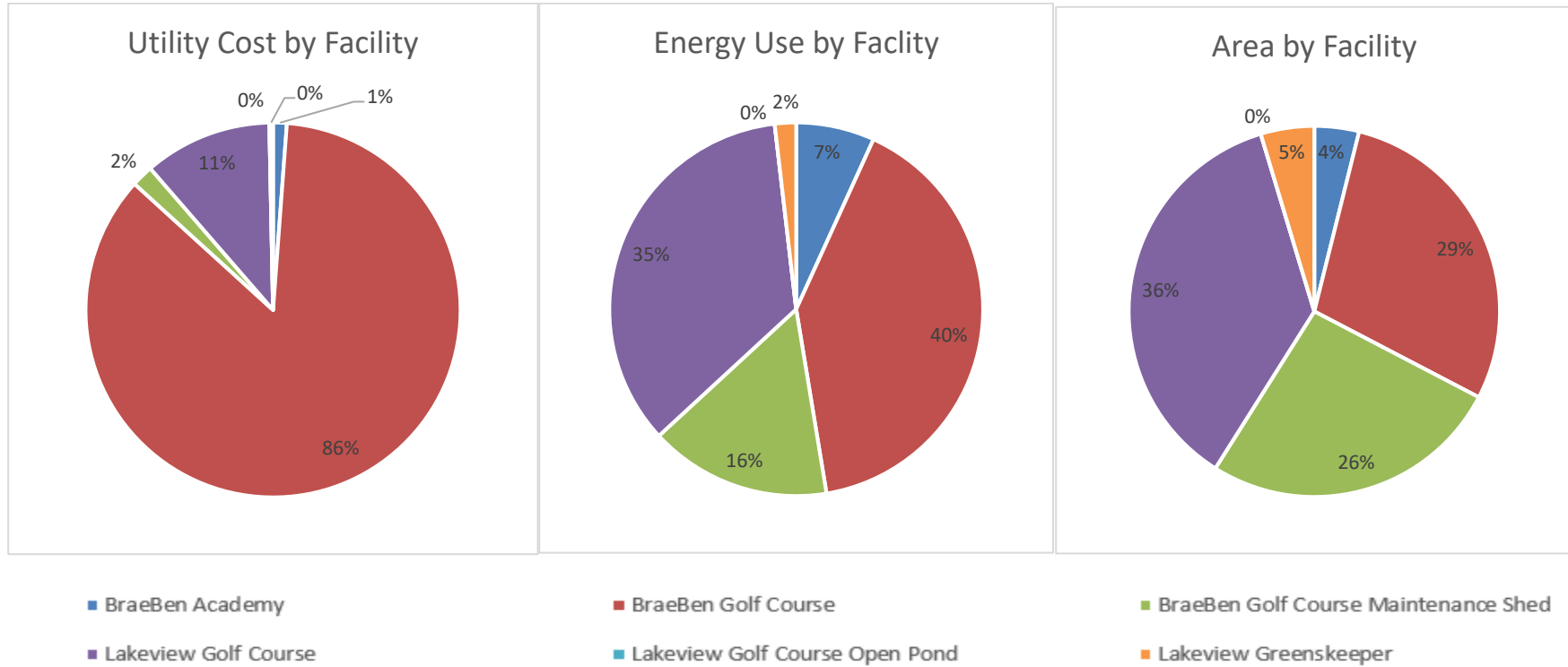


8.3 ENERGY AND GHG BREAKDOWN FOR GOLF COURSES AND ASSOCIATED FACILITIES

This section provides a brief overview/recap of the Utility and GHG data for **Golf Courses and Associated Facilities**. The table below summarizes, by facility, the utility usage and GHG emissions for 2023. Following are the key takeaways:

- The premises at BreaBen Golf Course represent the largest area in the group and contribute towards 63% and 89% of the energy consumption and utility costs respectively in the group
- The premises at Lakeview Golf Course contribute towards 37% and 11% of the energy consumption and utility costs respectively in the group

Figure 8-4: Utility Costs and Energy Use Breakdown by Facility



2023 Annual Report for Golf Courses and Associated Facilities

Facility	Area	Electricity		Natural Gas		Total Energy	Water		Total Costs	GHG Emissions
	m ²	kWh	\$	m ³	\$	e-kWh	m ³	\$	\$	kg
BraeBen Academy	186	12,827	2,047	7,563	2,951	92,239	-	-	4,998	14,913
BraeBen Golf Course	1,375	311,257	49,677	22,863	8,921	551,319	120,850	303,442	362,040	53,258
BraeBen Golf Course Maintenance Shed	1,257	-	-	20,353	7,942	213,707	-	-	7,942	39,098
Lakeview Golf Course	1,739	223,306	35,640	24,008	9,368	475,390	694	1,743	46,750	52,819
Lakeview Golf Course Open Pond	-	-	-	-	-	-	-	-	-	-
Lakeview Greenskeeper	223	1,036	165	2,285	892	25,029	111	279	1,336	4,421
Totals	4,780	548,426	87,529	77,072	\$30,073	1,357,682	121,655	305,464	\$423,066	164,508
Usage / Costs per m²:		114.73	18.31	16.12	6.29	284.03	25.45	63.90	88.51	34.42

8.4 ACTION PLAN

An action plan has been identified with the goal to save on electricity, natural gas, oil, and/or other form of energy consumption within a facility or location.





The following figure shows the various projects and initiatives that have been planned for **Golf Courses and Associated Facilities**. The chart shows what projects have been planned, when they are planned to be implemented, and the progress of implementation (if applicable). A brief description of each project has been noted below:

- **DHW Systems Energy Upgrades for Lifecycle Replacements:** Includes energy upgrades for DHW equipment that show energy & GHG emission savings.

For the chart below, the **Orange** coloured bars represent the original planned start and completion of a Measure type. The **Green** bar beneath shows the actual start and completion times for a completed measure, while the **Blue** bar shows the actual start time of a Measure that is currently being implemented, but not yet complete. Some Notes:

- A Single Measure timeline may include more than one implementation of that measure (example: In different facilities).
- Due to changing circumstances (change in operations, budget changes, new technology, etc.), a planned measure may be cancelled. These would be indicated by a **Red** plan bar on the chart.

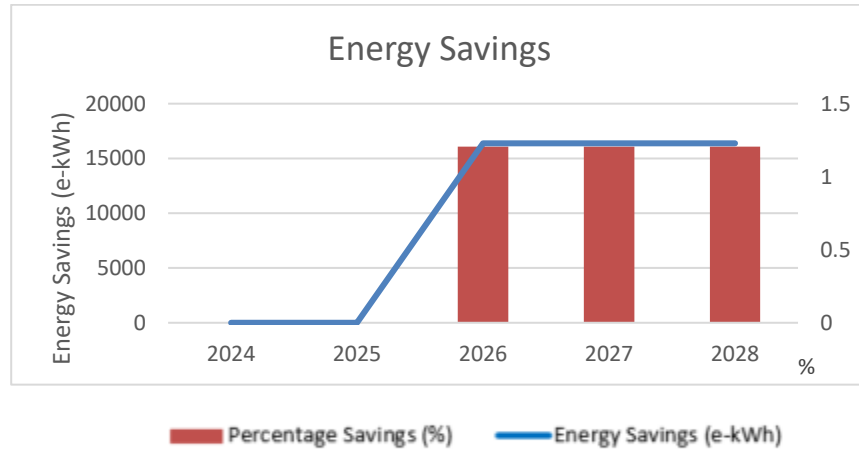
Energy Measure Implementation Plan for Golf Courses & Associated Facilities

Energy Measure	2024				2025				2026				2027				2028			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Energy Upgrade For DHW Systems																				
 Scheduled Implementation  Cancelled Implementation												Q1 = Jan - Mar Q2 = Apr - Jun								
 Status = Completed  Status = Underway												Q3 = Jul - Sep Q4 = Oct - Dec								

8.5 ESTIMATED SAVINGS

At the end of the plan, **Golf Courses and Associated Facilities** are expected to save 1.21% over the base year of 2023

Figure 7-6: Energy Measure Annual Savings for Fire Stations and Emergency Services



8.6 PROGRESS TO TARGETS

The City is targeting a 1.21% reduction in energy use in **Golf Courses and Associated Facilities** by 2028 over the base year, 2023. The reporting of energy consumption data and savings for **Golf Courses and Associated Facilities** will be based on utility meters and assembled annually. Since utility meters monitor energy consumption for the entire facility, the measurement boundary will encompass all parts of the facility. To determine the savings and fairly compare year-to-year energy consumption data, it is important to account for independent variables such as weather and occupancy and apply regression analysis to consumption data. Therefore, actual consumption data for each year starting 2024 will be adjusted to match the weather and occupancy of 2023. The figures below show the updated progress for each year against the set target.

9.0 HERITAGE BUILDINGS

9.1 SCOPE AND BOUNDARY

For the purposes of this report, the City of Mississauga has 5 facilities/locations that fall under the **Heritage Buildings** category. They include:

- Riverwood - Chappel Estate House
- Bussell House
- Meadowvale Hall
- Pinchin Property
- Pinchin Property - Leslie Log House

The above listed locations have a total floor area of approximately 1,000 square meters. This would account for 0.2% of the total building area for City of Mississauga facilities included in this Plan.

9.2 BASELINE

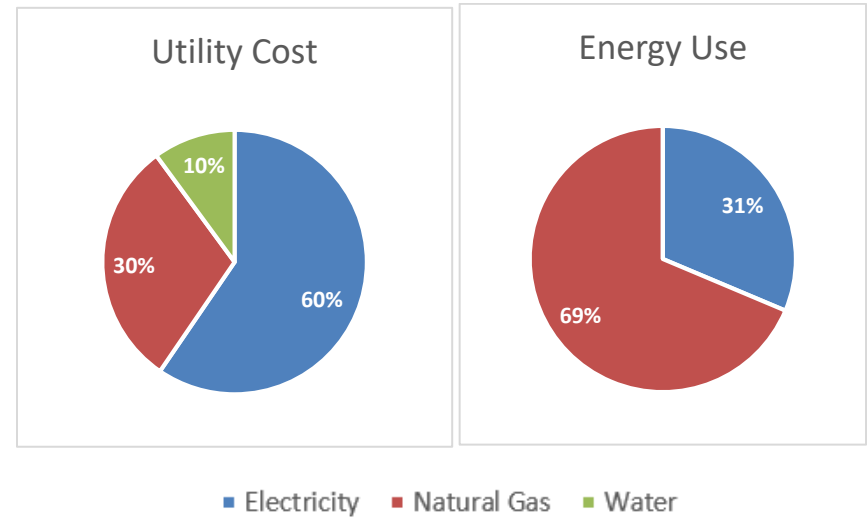
9.2.1 ENERGY USE

The energy use (combined electricity and natural gas) for **Heritage Buildings** was 351,000 equivalent kilowatt hours in 2023. Following are the key takeaways for the energy usage in 2023.

- 31% of the total energy usage was due to electricity use
- 69% of the total energy usage was due to natural gas use
- A total of \$47,400 in utility costs was incurred, out of which 60% is attributed to electricity, 30% to natural gas, and 10% to water

Heritage Buildings accounted for 0.1% of the City's total utility budget for 2023.

Figure 9-1: Utility Costs and Energy Use Breakdown for Heritage Buildings



9.2.2 ENERGY USE INTENSITY

Energy Use Intensity (EUI) is a measurement that expresses a building's energy use as a function of its size or other characteristic. It is used to give a better picture of the energy efficiency of a facility. The lower the EUI, the more efficient the facility is.

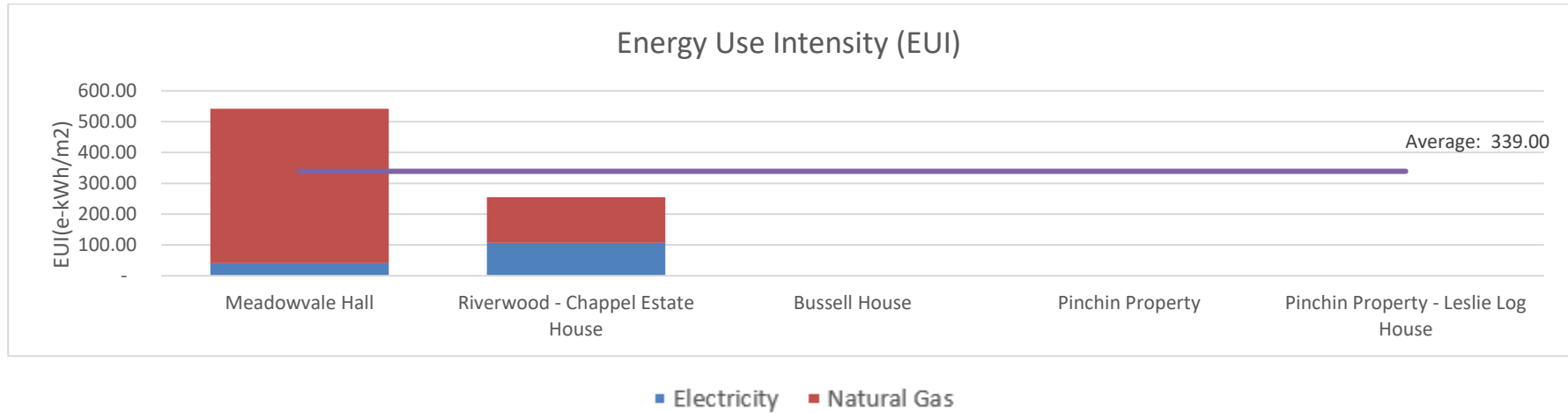
When reviewing EUI, the facility operation type and hours should be taken into account. For example, a facility that operates 24 hours a day will most likely have a higher EUI than a similar one that operates 8 hours a day. Similarly, a facility that has high energy using systems that do not contribute to the building area, such as an outdoor pool or outdoor ice rink, will have a higher EUI than a facility where those systems are located within the facility, as they would add to the facility's area footprint.

For **Heritage Buildings** the average EUI in 2023 was 339 e-kWh/m².

The following chart shows the EUI for each facility within **Heritage Buildings**, and compares it to the average for the group.

Note: The Average EUI value is calculated by taking the total energy use of all facilities, and dividing by the total area of the facilities. As such, a larger facility would have a bigger impact on the average than a smaller facility.

Figure 9-2: Energy Use Intensity for Heritage Buildings

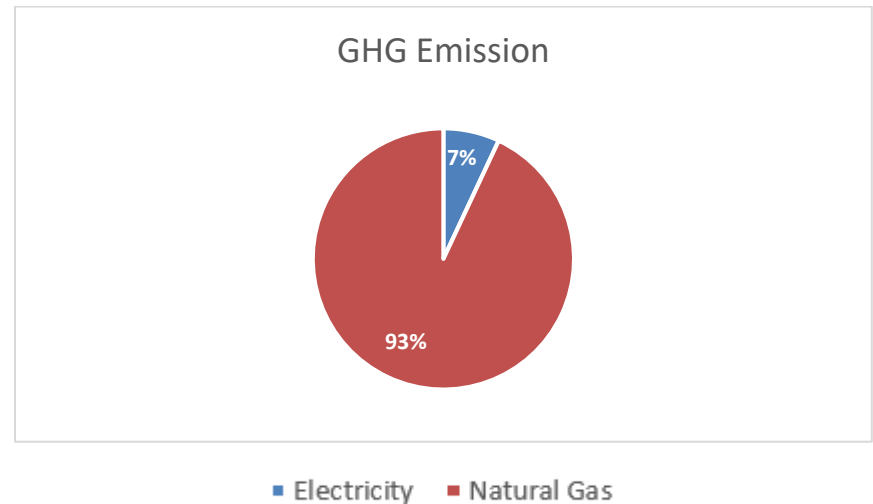


9.2.3 GREENHOUSE GAS (GHG) EMISSIONS

For 2023, **Heritage Buildings** emitted 47,400 kg (or 47 tonnes) of CO₂ in 2023. 7% of these emissions were due to the generation of electricity, while the use of natural gas accounted for the remaining 93%.

Heritage Buildings accounted for 0.2% of the City's total GHG emissions for facilities included in the plan.

Figure 9-3: GHG Emissions Breakdown for Heritage Buildings

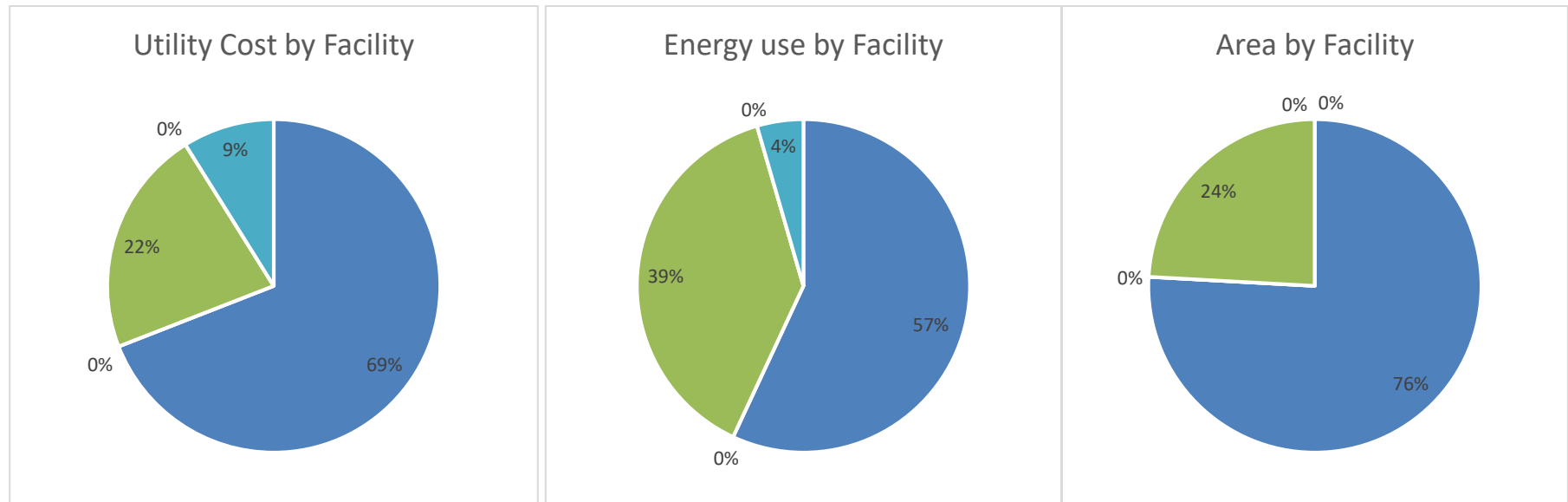


9.3 ENERGY AND GHG BREAKDOWN FOR HERITAGE BUILDINGS

This section provides a brief overview/recap of the Utility and GHG data for **Heritage Buildings**. The table below summarizes, by facility, the energy usage and utility usage for 2023. Following are the key takeaways:

- The Riverwood Chappel Estate House represents the largest area in the group and contributes towards 57% and 69% of the energy consumption and utility costs respectively in the group
- The Meadowvale Hall is the second largest area in the group and contributes towards 39% and 22% of the energy consumption and utility costs respectively in the group

Figure 9-4: Utility Costs and Energy Use Breakdown by Facility



■ Riverwood - Chappel Estate House ■ Bussell House ■ Meadowvale Hall ■ Pinchin Property ■ Pinchin Property - Leslie Log House

2023 Annual Report for Heritage Buildings

Facility	Area	Electricity		Natural Gas		Total Energy	Water		Total Costs	GHG Emissions
	m ²	kWh	\$	m ³	\$	e-kWh	m ³	\$	\$	kg
Riverwood - Chappel Estate House	786	84,019	\$13,409	11,049	\$4,311	200,034	1,061	\$2,664	\$20,385	23,746
Bussell House	0	0	\$0	0	\$0	0	0	\$0	\$0	0
Meadowvale Hall	250	10,266	\$1,638	11,920	\$4,651	135,426	83	\$208	\$6,498	23,206
Pinchin Property	0	0	\$0	0	\$0	0	0	\$0	\$0	0
Pinchin Property - Leslie Log House	0	15,812	\$2,524	0	\$0	15,812	41	\$103	\$2,627	474
Totals	1,036	110,097	\$17,571	22,969	\$8,963	351,272	1,185	\$2,975	\$29,509	47,426
Usage / Costs per m²:		106.3	17.0	22.2	8.7	339.1	1.1	2.9	28.5	45.8

9.4 ACTION PLAN

No action plan has been identified with the goal to save on electricity, natural gas, oil, and/or other form of energy consumption due to the historic and heritage-designation of the facilities in this group.

9.5 ESTIMATED SAVINGS

Since no action plan exists for this category, no savings are expected.

10.0 LEASED FACILITIES AND PROPERTIES

10.1 SCOPE AND BOUNDARY

For the purposes of this report, the City of Mississauga has 9 facilities/locations that fall under this category. They include:

- Front Street Pumping Station
- Harding Estate
- Mary Fix House
- Old Fire Hall - Malton (Malton Boy Scouts)
- Riverwood - Art Studio (Visual Arts Mississauga)
- Riverwood - McEwan Estate House
- Riverwood - McEwan Estate Barn
- Russell Langmaid Property
- Sheridan College Parking Lot

The above listed locations have a total floor area of approximately 2,900 square meters. This would account for 0.6% of the total building area for City of Mississauga facilities included in this Plan.

10.2 BASELINE

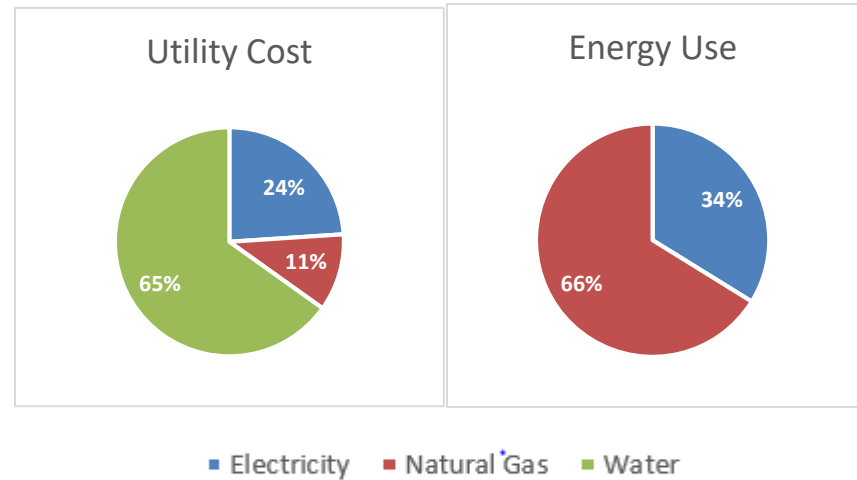
10.2.1 ENERGY USE

The energy use (combined electricity and natural gas) for **Leased Facilities and Properties** was 1,255,000 equivalent kilowatt hours in 2023. Following are the key takeaways for the energy usage in 2023:

- 34% of the total energy usage was due to electricity use
- 66% of the total energy usage was due to natural gas use
- A total of \$283,000 in utility costs was incurred, out of which 24% is attributed to electricity, 11% to natural gas, and 65% to water

Leased Facilities and Properties accounted for 1.4% of the City's total utility budget for 2023.

Figure 10-1: Utility Costs and Energy Use Breakdown for Leased Facilities and Properties



10.2.2 ENERGY USE INTENSITY

Energy Use Intensity (EUI) is a measurement that expresses a building's energy use as a function of its size or other characteristic. It is used to give a better picture of the energy efficiency of a facility. The lower the EUI, the more efficient the facility is.

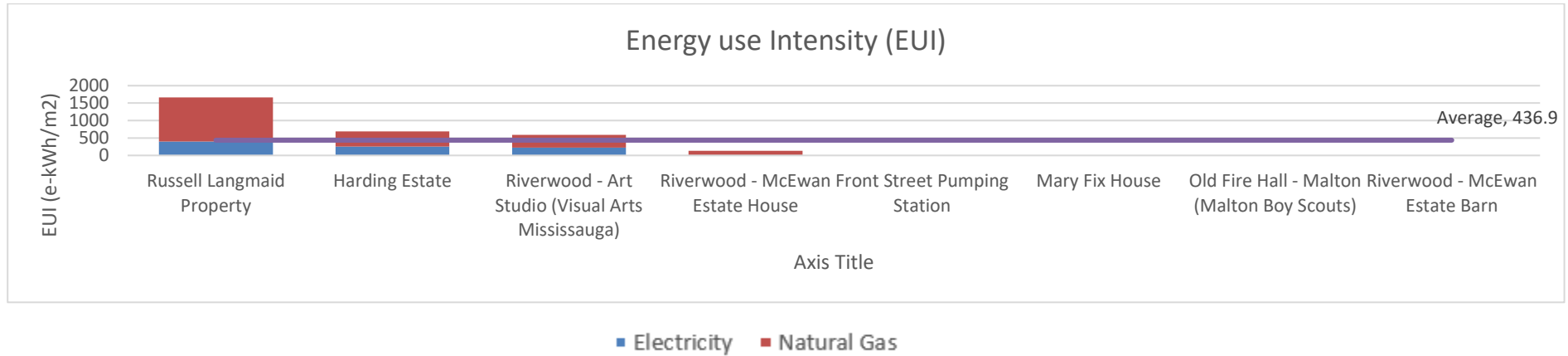
When reviewing EUI, the facility operation type and hours should be taken into account. For example, a facility that operates 24 hours a day will most likely have a higher EUI than a similar one that operates 8 hours a day. Similarly, a facility that has high energy using systems that do not contribute to the building area, such as an outdoor pool or outdoor ice rink, will have a higher EUI than a facility where those systems are located within the facility, as they would add to the facility's area footprint.

For **Heritage Buildings** the average EUI in 2023 was 437 e-kWh/m².

The following chart shows the EUI for each facility within **Leased Facilities and Properties**, and compares it to the average for the group.

Note: The Average EUI value is calculated by taking the total energy use of all facilities, and dividing by the total area of the facilities. As such, a larger facility would have a bigger impact on the average than a smaller facility.

Figure 10-2: Energy Use Intensity for Leased Facilities and Properties

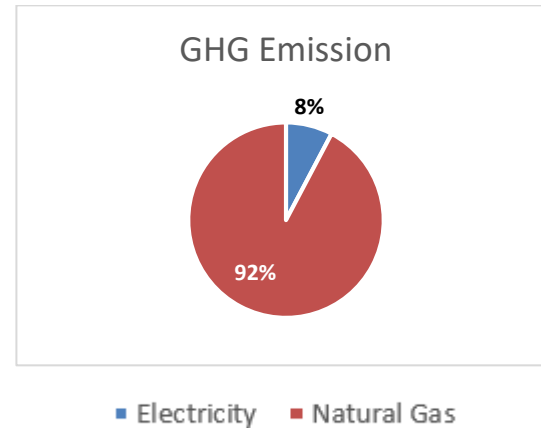


10.2.3 GREENHOUSE GAS (GHG) EMISSIONS

For 2023, **Leased Facilities and Properties** emitted 164,000 kg (or 164tonnes) of CO₂ in 2023. 8% of these emissions were due to the generation of electricity, while the use of natural gas accounted for the remaining 92%.

Leased Facilities and Properties accounted for 0.2% of the City's total GHG emissions for facilities included in the plan.

Figure 10-3: GHG Emissions Breakdown for Leased Facilities and Properties

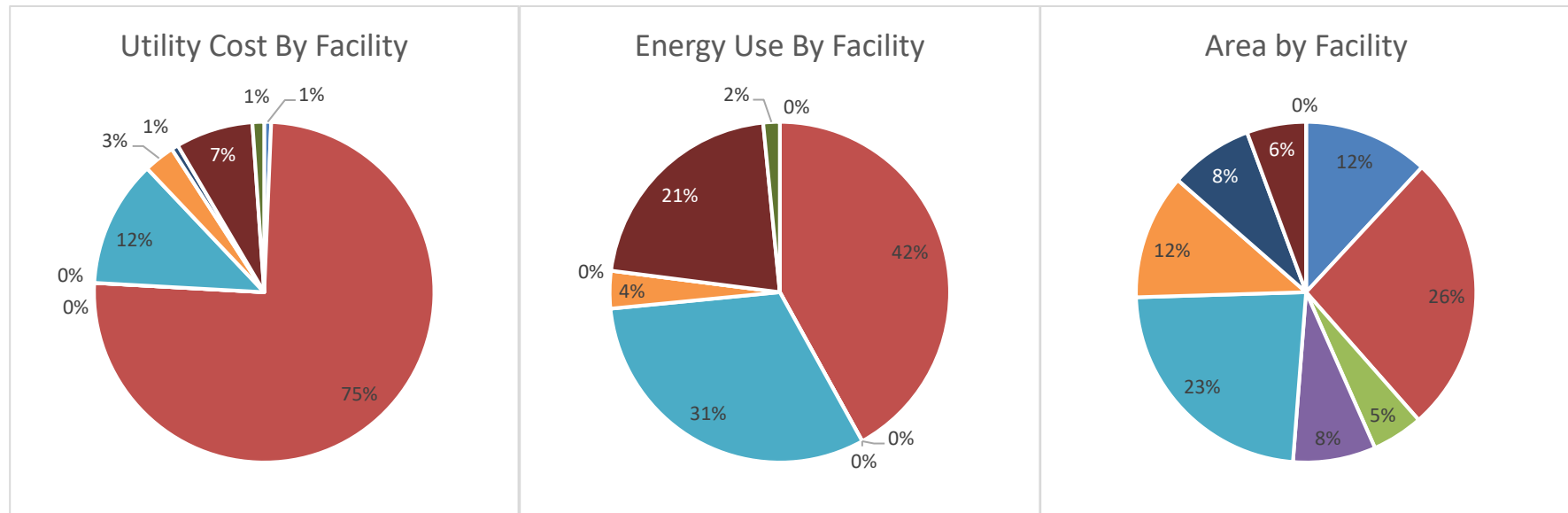


10.3 ENERGY AND GHG BREAKDOWN FOR LEASED FACILITIES AND PROPERTIES

This section provides a brief overview/recap of the Utility and GHG data for **Leased Facilities and Properties**. The table below summarizes, by facility, the utility usage and GHG emissions for 2023.

- The Harding Estate represents the largest area in the group and contributes towards 42% and 75% of the energy consumption and utility costs respectively in the group
- The Riverwood Art Studio is the second largest area in the group and contributes towards 31% and 12% of the energy consumption and utility costs respectively in the group

Figure 8-4: Utility Costs and Energy Use Breakdown by Facility



- Front Street Pumping Station
- Harding Estate
- Mary Fix House
- Old Fire Hall - Malton (Malton Boy Scouts)
- Riverwood - Art Studio (Visual Arts Mississauga)
- Riverwood - McEwan Estate House
- Riverwood - McEwan Estate Barn
- Russell Langmaid Property
- Sheridan College Parking Lot

2023 Annual Report for Leased Facilities and Properties

Facility	Area	Electricity		Natural Gas		Total Energy	Water		Total Costs	GHG Emissions
	m ²	kWh	\$	m ³	\$	e-kWh	m ³	\$	\$	kg
Front Street Pumping Station	342	0	\$0	0	\$0	0	742	1,863	\$1,863	0
Harding Estate	764	192,080	\$30,656	31,859	\$12,431	526,600	67,561	169,639	\$212,726	66,964
Mary Fix House	140	-	\$0	-	-	-	-	-	-	-
Old Fire Hall - Malton (Malton Boy Scouts)	226	-	\$0	-	-	-	-	-	-	-
Riverwood - Art Studio (Visual Arts Mississauga)	669	147,870	\$23,600	23,564	\$9,195	395,292	520	1,306	\$34,100	49,703
Riverwood - McEwan Estate House	342	408	\$65	4,220	\$1,647	44,718	2,632	6,609	\$8,320	8,119
Riverwood - McEwan Estate Barn	228	-	\$0	-	-	-	735	1,846	\$1,846	-
Russell Langmaid Property	162	64,394	\$10,277	19,467	\$7,596	268,798	1,179	2,960	\$20,834	39,328
Sheridan College Parking Lot	0	19,674	\$3,140	-	-	19,674	-	-	\$3,140	590
Totals	2,873	424,426	\$67,738	79,110	\$30,869	1,255,081	73,369	184,222	\$282,829	164,703
Usage / Costs per m²:		147.7	23.6	27.5	10.7	436.9	25.5	64.1	98.4	57.3

10.4 ACTION PLAN

No action plan has been identified with the goal to save on electricity, natural gas, oil, and/or other form of energy consumption since the facilities are operated and occupied by another entity.

10.5 ESTIMATED SAVINGS

Since no action plan exists for this category, no savings are expected.

11.0 LIBRARIES

11.1 SCOPE AND BOUNDARY

The Libraries Group includes all facilities that act as standalone libraries. Libraries located in a community centre are listed under that community centre and would not be included in this section.

For the purposes of this report, the City of Mississauga has 9 facilities/locations that fall under this category. They include:

- Burnhamthorpe Library & Maja Prentice Theatre
- Churchill Meadows Library
- Lakeview Library
- Lorne Park Library
- Mississauga Central Library
- Sheridan Library
- Streetsville Library
- Woodlands Library
- Port Credit Library

The above listed locations have a total floor area of approximately 44,000 square meters. This would account for 9.4 % of the total building area for City of Mississauga facilities included in this Plan.

11.2 BASELINE

11.2.1 ENERGY USE

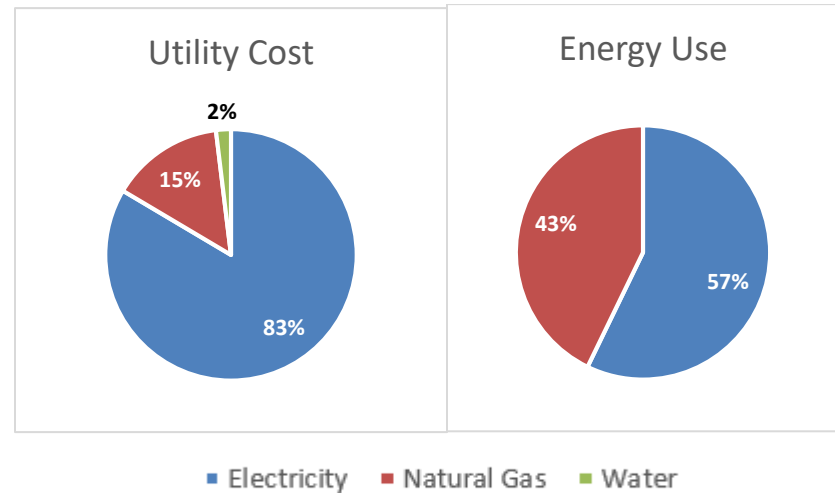
The energy use (combined electricity and natural gas) for **Libraries** was 8,286,900 equivalent kilowatt hours in 2023. Following are the key takeaways for the energy usage in 2023:

- 43% of the total energy usage was due to electricity use
- 57% of the total energy usage was due to natural gas use,

- A total of \$905,000 in utility costs was incurred, out of which 83% is attributed to electricity, 15% to natural gas, and 2% to water

Libraries accounted for 4.5% of the City's total utility budget for 2023.

Figure 11-1: Utility Costs and Energy Use Breakdown for Libraries



11.2.2 ENERGY USE INTENSITY

Energy Use Intensity (EUI) is a measurement that expresses a building's energy use as a function of its size or other characteristic. It is used to give a better picture of the energy efficiency of a facility. The lower the EUI, the more efficient the facility is.

When reviewing EUI, the facility operation type and hours should be taken into account. For example, a facility that operates 24 hours a day will most likely have a higher EUI than a similar one that operates 8 hours a day. Similarly, a facility that has high energy using systems that do not contribute to the building area, such as an outdoor pool or outdoor ice

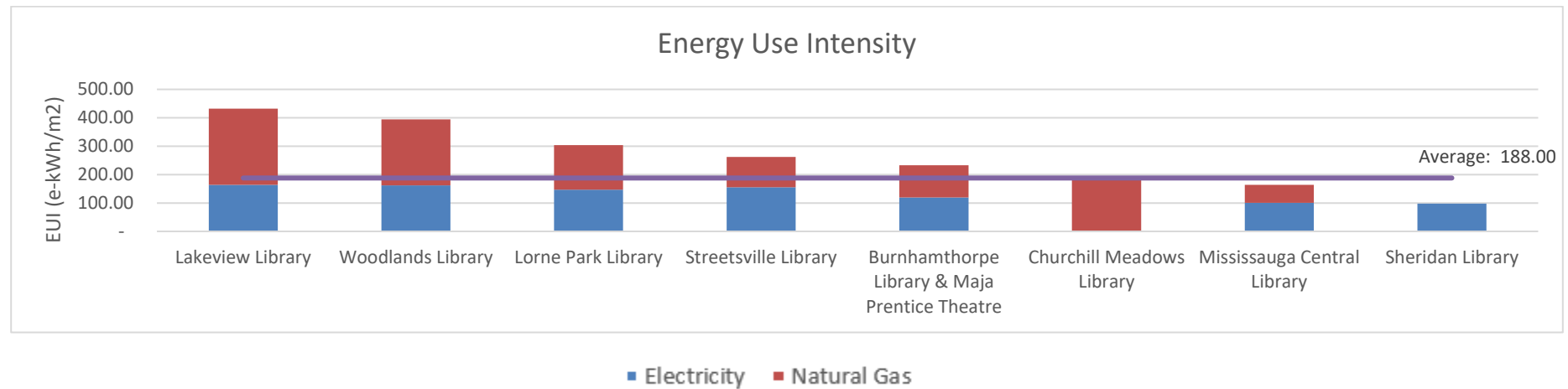
rink, will have a higher EUI than a facility where those systems are located within the facility, as they would add to the facility's area footprint.

For **Libraries** the average EUI in 2023 was 188 e-kWh/m².

The following chart shows the EUI for each facility within **Libraries**, and compares it to the average for the group.

Note: The Average EUI value is calculated by taking the total energy use of all facilities, and dividing by the total area of the facilities. As such, a larger facility would have a bigger impact on the average than a smaller facility.

Figure 11-2: Energy Use Intensity for Libraries

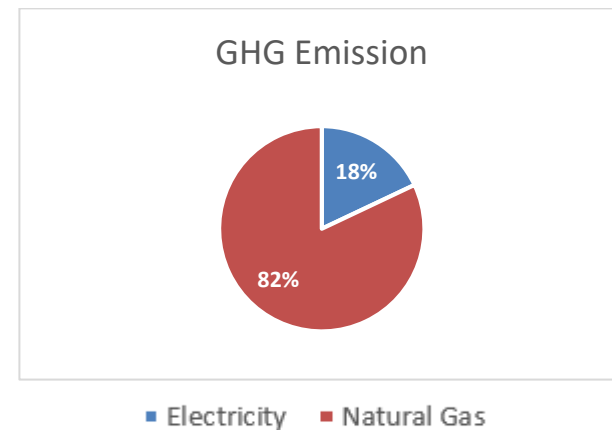


11.2.3 GREENHOUSE GAS (GHG) EMISSIONS

For 2023, **Libraries** emitted 791,224 kg (or 791 tonnes) of CO₂ in 2023. 18% of these emissions were due to the generation of electricity, while the use of natural gas accounted for the remaining 82%.

Libraries accounted for 3.9% of the City's total GHG emissions for facilities included in the plan.

Figure 11-3: GHG Emissions Breakdown for Libraries



11.3 ENERGY AND GHG BREAKDOWN FOR LIBRARIES

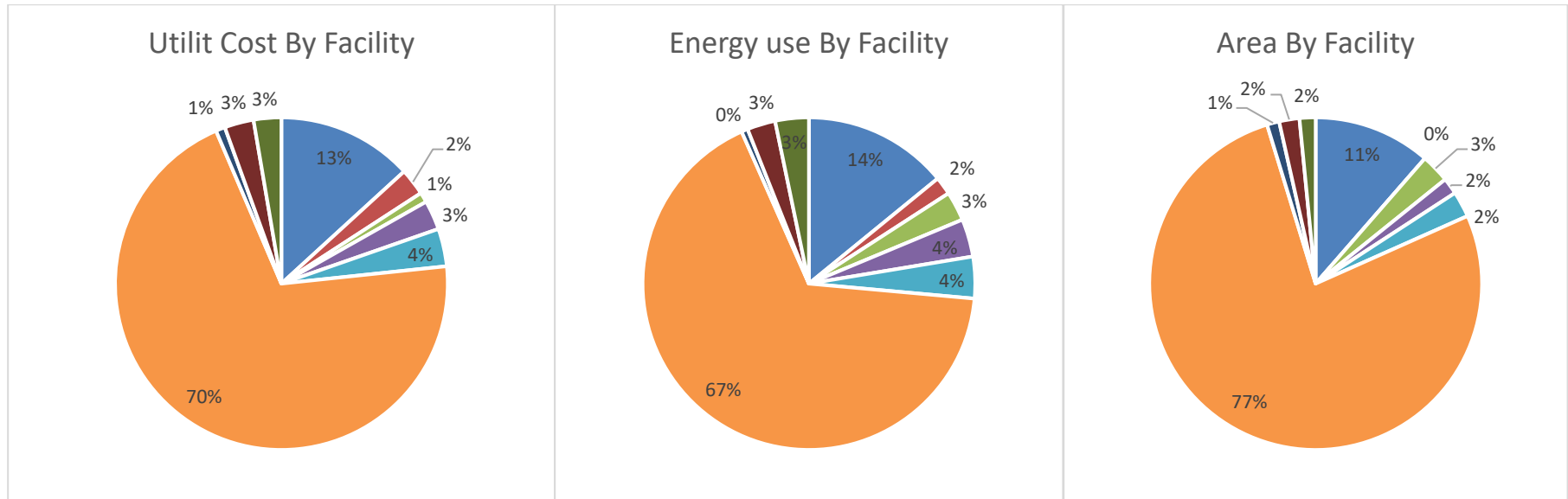
This section provides a brief overview/recap of the Utility and GHG data for **Libraries**. The table below summarizes, by facility, the utility usage and GHG emissions for 2023. Following are the key takeaways:

- Mississauga Central Library is by far the largest facility in this group by area and represents the largest energy consumption (67%) and utility consumption (70%) in this group
- Burnhamthorpe Library & Maja Prentice Theatre represents the second largest facility by area in this group and contributes 14%

and 12% towards the energy consumption and utility consumption in the group

- The remaining nine (9) libraries represent 17% of the facility area in the group and contribute 19% and 18% towards the energy consumption and utility consumption in the group
- Electrical loads such as lighting and fan energy dominate the energy usage in this group
- Central library and Burnhamthorpe had major renovation done b 2023

Figure 11-4: Utility Costs and Energy Use Breakdown by Facility



- Burnhamthorpe Library & Maja Prentice Theatre
- Lakeview Library
- Sheridan Library
- Port Credit Library
- Lorne Park Library
- Streetsville Library
- Churchill Meadows Library
- Mississauga Central Library
- Woodlands Library

2023 Annual Report for Libraries

Facility	Area	Electricity		Natural Gas		Total Energy	Water		Total Costs	GHG Emissions
	m ²	kWh	\$	m ³	\$	e-kWh	m ³	\$	\$	kg
Burnhamthorpe Library & Maja Prentice Theatre	5,024	598,175	\$95,469	54,298	\$21,187	1,168,304	1,185	\$2,975	\$119,631	122,252
Port Credit Library		145,550	\$23,230	-	-	145,550	206	\$517	\$23,747	4,367
Churchill Meadows Library	1,232	-	-	22,534	\$8,793	236,607	-	-	\$8,793	43,288
Lakeview Library	705	115,450	\$18,426	18,005	\$7,026	304,503	175	\$439	\$25,891	38,051
Lorne Park Library	1,108	162,955	\$26,008	16,485	\$6,432	336,048	298	\$748	\$33,188	36,556
Mississauga Central Library	33,877	3,419,857	\$545,809	202,536	\$79,030	5,546,485	4,507	\$11,317	\$636,155	491,667
Sheridan Library	525	51,278	\$8,184	-	-	51,278	-	-	\$8,184	1,538
Streetsville Library	867	135,137	\$21,568	8,808	\$3,437	227,621	280	\$703	\$25,708	20,974
Woodlands Library	686	110,902	\$17,700	15,202	\$5,932	270,523	281	\$706	\$24,337	32,530
Totals	44,024	4,739,304	\$756,393	337,868	\$131,836	8,286,918	6,932	\$17,406	\$905,635	791,224
Usage / Costs per m²:		107.7	17.2	7.7	3.0	188.2	0.2	0.4	20.6	18.0

11.4 ACTION PLAN

An action plan has been identified with the goal to save on electricity, natural gas, oil, and/or other form of energy consumption within a facility or location.

The following figure shows the various projects and initiatives that have been planned for **Libraries**. The chart shows what projects have been planned, when they are planned to be implemented, and the progress of implementation (if applicable). A brief description of each project has been noted below:

- **Ongoing Commissioning:** Conduct regular commissioning to the city's high consuming building using the data analytics/fault detection tools that collects, manages, and analyzes data from various building systems, to identify operation irregularities and ensure optimum operation.
- **HVAC Systems Energy Upgrades for Lifecycle Replacements:** Includes energy upgrades for HVAC equipment that show energy & GHG emission savings.
- **Controls Upgrades:** Includes controller upgrades, optimized sequence of operations, and additional points to better manage and control building systems






- **Metering & Sub-metering:** Includes real-time monitoring of building and select components to provide the ability to analyze consumption data, identify solutions to conserve energy, and conduct measurement & verification
- **Lighting Upgrades:** Includes replacement of existing lighting technologies to newer technologies like LEDs, and better controls through localized sensors and BAS scheduling

For the chart below, the **Orange** coloured bars represent the original planned start and completion of a Measure type. The **Green** bar beneath shows the actual start and completion times for a completed measure, while the **Blue** bar shows the actual start time of a Measure that is currently being implemented, but not yet complete. Some Notes:

- A Single Measure timeline may include more than one implementation of that measure (example: In different facilities).
- Due to changing circumstances (change in operations, budget changes, new technology, etc.), a planned measure may be cancelled. These would be indicated by a **Red** plan bar on the chart.

Figure 11-5: Energy Measure Implementation Plan for Libraries

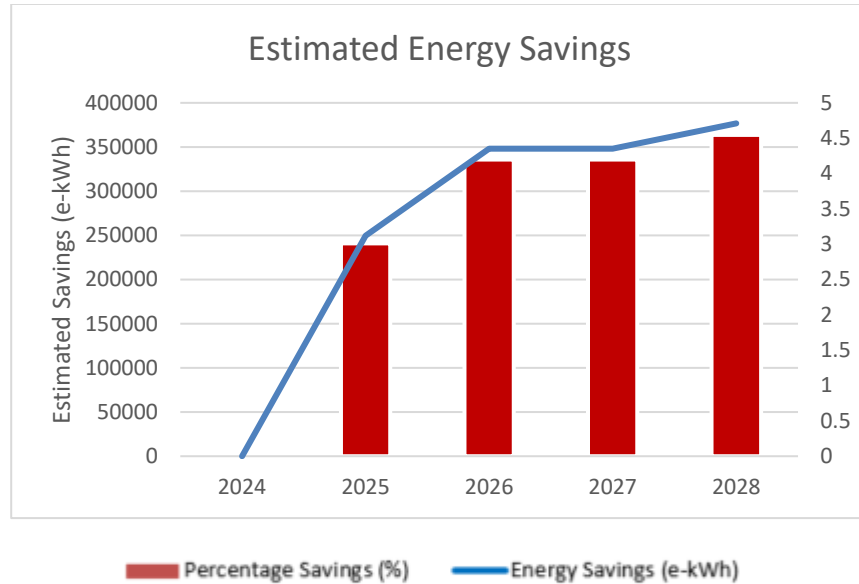
Energy Measure Implementation Plan for Libraries

Energy Measure	2024				2025				2026				2027				2028			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Building Ongoing Commissioning	Planned Implementation																			
Energy Upgrade For HVAC Systems	Planned Implementation																			
Control Upgrade	Planned Implementation																			
Metering & Submetering Equipment	Planned Implementation																			
Lighting Upgrades	Planned Implementation																			
Planned Implementation  Scheduled Implementation  Cancelled Implementation 															Q1 = Jan - Mar Q2 = Apr - Jun Q3 = Jul - Sep Q4 = Oct - Dec					
Community Cent  Status = Completed  Status = Underway																				

11.5 ESTIMATED SAVINGS

At the end of the plan, **Libraries** are expected to save 4.55% over the base year of 2023.

Figure 11-6: Energy Measure Annual Savings for Libraries



11.6 PROGRESS TO TARGETS

The City is targeting a 4.55% reduction in energy use in **Libraries** by 2028 over the base year, 2023. The reporting of energy consumption data and savings for **Libraries** will be based on utility meters and assembled annually. Since utility meters monitor energy consumption for the entire facility, the measurement boundary will encompass all parts of the facility. To determine the savings and fairly compare year-to-year energy consumption data, it is important to account for independent variables such as weather and occupancy and apply regression analysis to consumption data. Therefore, actual consumption data for each year starting 2024 will be adjusted to match the weather and occupancy of 2023. The figures below show the updated progress for each year against the set target.

12.0 COMMUNITY HALLS, MARINAS, AND ANIMAL SERVICES

12.1 SCOPE AND BOUNDARY

For the purposes of this report, the City of Mississauga has 13 facilities/locations that fall under this category. They include:

- Adamson Estate - Barn
- Adamson Estate - Derry House
- Adamson Estate - Main House
- Animal Services Centre
- Brookmeade Centre
- Cawthra Elliot Estate - House
- Clarke Memorial Hall
- Credit Village Marina
- Erindale Community Hall
- Lakefront Promenade Marina
- Lorne Park Hall
- Malton Hall (Victory)
- Streetsville Kinsmen Hall

The above listed locations have a total floor area of approximately 6,920 square meters. This would account for 1.5% of the total building area for City of Mississauga facilities included in this Plan.

12.2 BASELINE

12.2.1 ENERGY USE

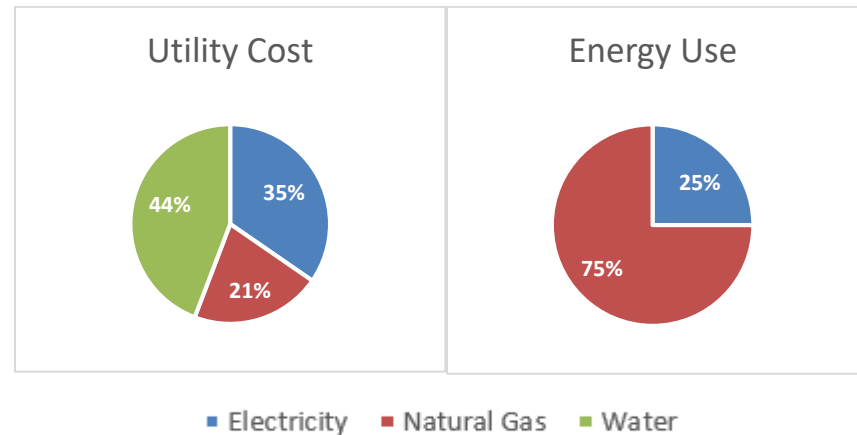
The energy use (combined electricity and natural gas) for **Community Halls, Marinas, and Animal Services** was 2,406,000 equivalent kilowatt hours in 2023. Following are the key takeaways for the energy usage in 2023:

- 25% of the total energy usage was due to electricity use.

- 75% of the total energy usage was due to natural gas use.
- A total of \$275,000 in utility costs was incurred, out of which 35% is attributed to electricity, 21% to natural gas, and 44% to water

Community Halls, Marinas, and Animal Services accounted for 1.4% of the City's total utility budget for 2023.

Figure 12-1: Utility Costs and Energy Use Breakdown for Community Halls, Marinas, and Animal Services



12.2.2 ENERGY USE INTENSITY

Energy Use Intensity (EUI) is a measurement that expresses a building's energy use as a function of its size or other characteristic. It is used to give a better picture of the energy efficiency of a facility. The lower the EUI, the more efficient the facility is.

When reviewing EUI, the facility operation type and hours should be taken into account. For example, a facility that operates 24 hours a day will most likely have a higher EUI than a similar one that operates 8 hours a day. Similarly, a facility that has high energy using systems that do not contribute to the building area, such as an outdoor pool or outdoor ice

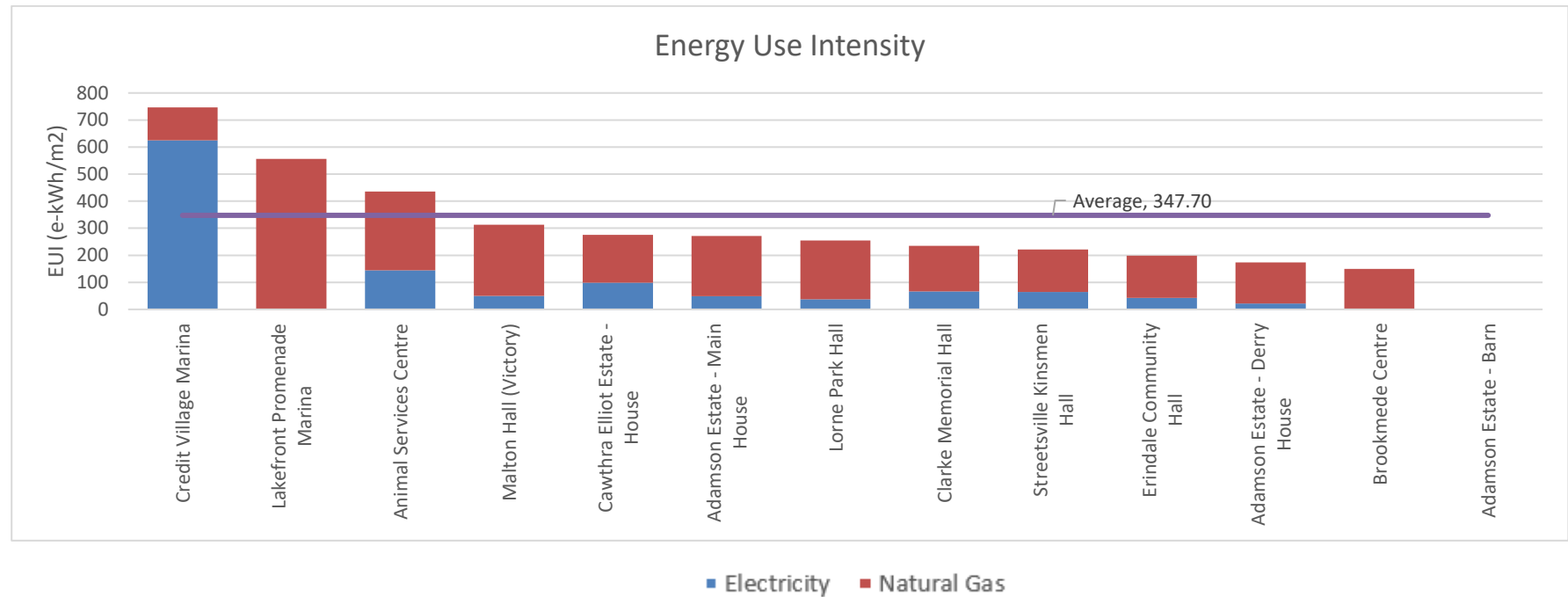
rink, will have a higher EUI than a facility where those systems are located within the facility, as they would add to the facility's area footprint.

For **Community Halls, Marinas, and Animal Services** the average EUI in 2023 was 347.7 e-kWh/m².

The following chart shows the EUI for each facility within **Community Halls, Marinas, and Animal Services**, and compares it to the average for the group.

Note: The Average EUI value is calculated by taking the total energy use of all facilities, and dividing by the total area of the facilities. As such, a larger facility would have a bigger impact on the average than a smaller facility.

Figure 12-2: Energy Use Intensity for Community Halls, Marinas, and Animal Services

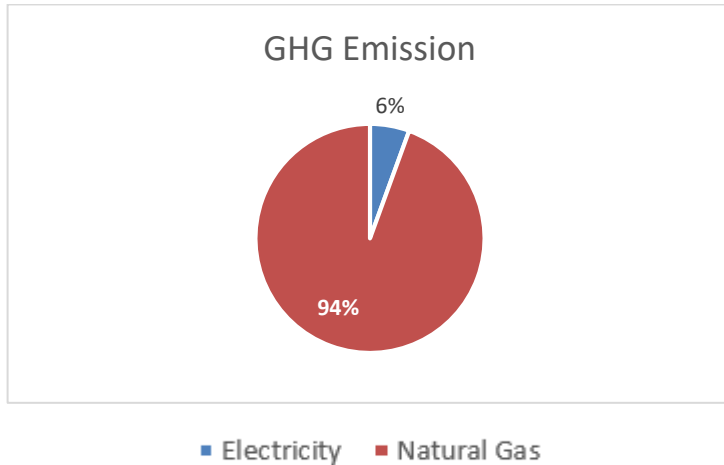


12.2.3 GREENHOUSE GAS (GHG) EMISSIONS

For 2023, **Community Halls, Marinas, and Animal Services** emitted 305,800 kg (or 305.8 tonnes) of CO₂ in 2023. 6% of these emissions were due to the generation of electricity, while the use of natural gas accounted for the remaining 94%.

Community Halls, Marinas, and Animal Services accounted for 1.5% of the City's total GHG emissions for facilities included in the plan.

Figure 12-3: GHG Emissions Breakdown for Community Halls, Marinas, and Animal Services



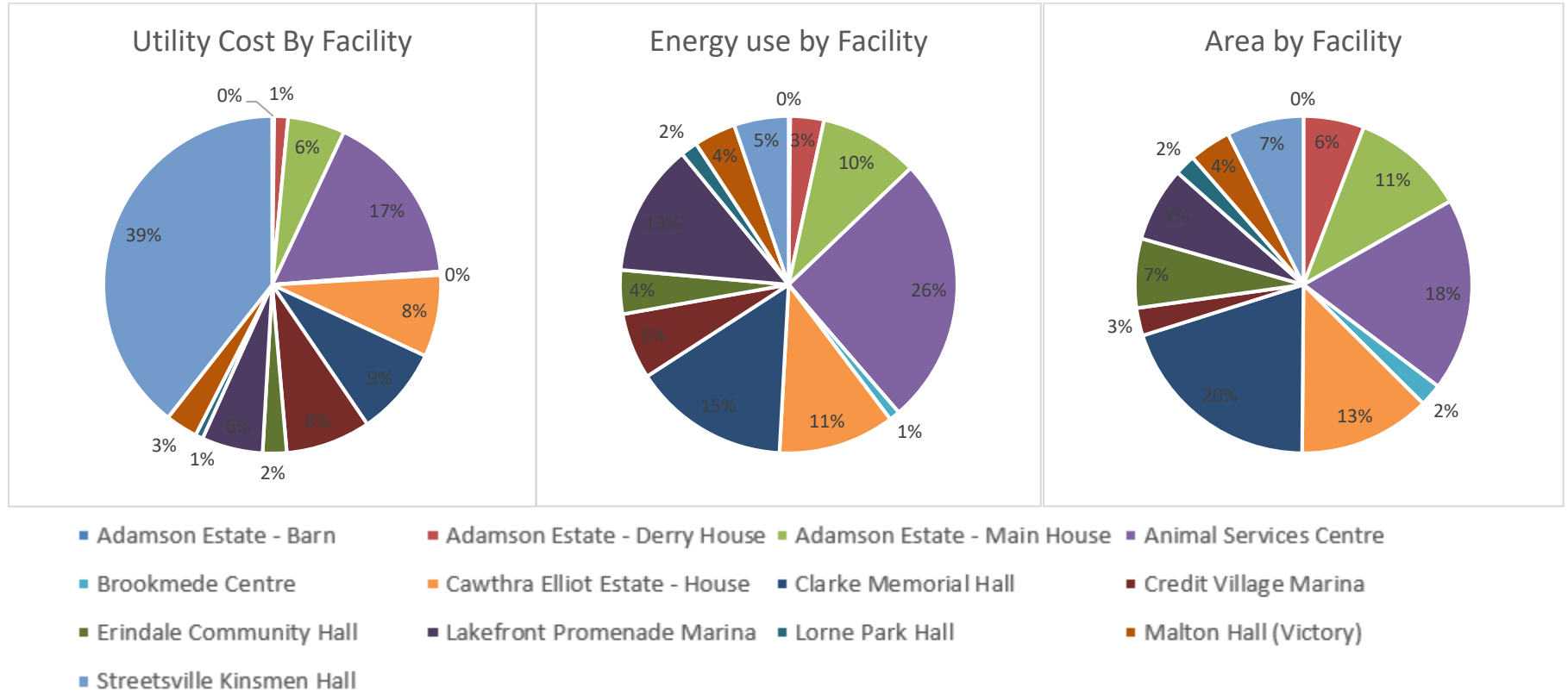
- The two estates: Adamson Estate and Cawthra Elliot Estate, represent 30% of the floor area in the group and contribute 22% and 14% towards the energy consumption and utility consumption in the group
- Animal Services Centre represents the second largest facility by area in this group and contributes 23% and 17% towards the energy consumption and utility consumption in the group

12.3 ENERGY AND GHG BREAKDOWN FOR COMMUNITY HALLS, MARINAS, AND ANIMAL SERVICES

This section provides a brief overview/recap of the Utility and GHG data for **Community Halls, Marinas, and Animal Services**. The table below summarizes, by facility, the utility usage and GHG emissions for 2023. Following are the key takeaways:

- Clarke Memorial Hall, Erindale Community Hall, Streetsville Kinsmen Hall, Malton Hall, Lorne Park Hall, represent 40% of the floor area in the group and contribute 27% and 54% towards the energy consumption and utility consumption in the group

Figure 12-4: Utility Costs and Energy Use Breakdown by Facility



12.4 ACTION PLAN

An action plan has been identified with the goal to save on electricity, natural gas, oil, and/or other form of energy consumption within a facility or location.

The following figure shows the various projects and initiatives that have been planned for **Community Halls, Marinas and Animal Services**. The chart shows what projects have been planned, when they are planned to be implemented, and the progress of implementation (if applicable). A brief description of each project has been noted below:

- HVAC Systems Energy Upgrades for Lifecycle Replacements:**
 Includes energy upgrades for HVAC equipment that show energy & GHG emission savings.

- DHW Systems Energy Upgrades for Lifecycle Replacements:**
 Includes energy upgrades for DHW equipment that show energy & GHG emission savings.

For the chart below, the **Orange** coloured bars represent the original planned start and completion of a Measure type. The **Green** bar beneath shows the actual start and completion times for a completed measure, while the **Blue** bar shows the actual start time of a Measure that is currently being implemented, but not yet complete. Some Notes:

- A Single Measure timeline may include more than one implementation of that measure (example: In different facilities).
- Due to changing circumstances (change in operations, budget changes, new technology, etc.), a planned measure may be cancelled. These would be indicated by a **Red** plan bar on the chart

Figure 7-5: Energy Measure Implementation Plan for Fire Stations and Emergency Services

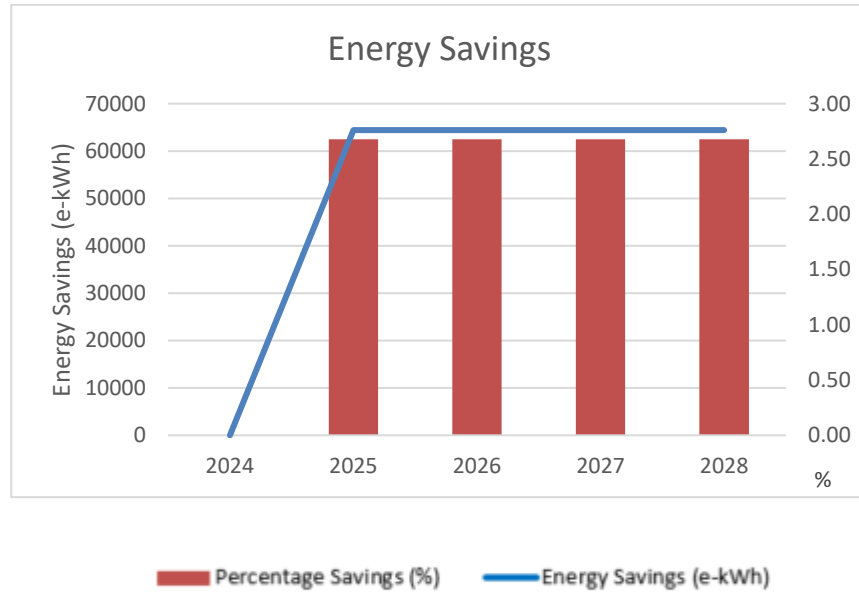
Energy Measure Implementation Plan for Community Halls, Marinas and Animal Services

Energy Measure	2024				2025				2026				2027				2028			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Energy Upgrade For HVAC Systems																				
Energy Upgrade For DHW Systems																				
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> Scheduled Implementation </div> <div style="text-align: center;"> Cancelled Implementation </div> </div>												Q1 = Jan - Mar Q2 = Apr - Jun Q3 = Jul - Sep Q4 = Oct - Dec								
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> Status = Completed </div> <div style="text-align: center;"> Status = Underway </div> </div>																				

12.5 ESTIMATED SAVINGS

At the end of the plan, **Community Halls, Marinas and Animal Services** are expected to save 2.7% over the base year of 2023.

Figure 7-6: Energy Measure Annual Savings for Fire Stations and Emergency Services



12.6 PROGRESS TO TARGETS

The City is targeting a 2.7% reduction in energy use in **Community Halls, Marinas, and Animal Services** by 2028 over the base year, 2023. The reporting of energy consumption data and savings for **Community Halls, Marinas, and Animal Services** will be based on utility meters and assembled annually. Since utility meters monitor energy consumption for the entire facility, the measurement boundary will encompass all parts of the facility. To determine the savings and fairly compare year-to-year energy consumption data, it is important to account for independent variables such as weather and occupancy and apply regression analysis to consumption data. Therefore, actual consumption data for each year starting 2024 will be adjusted to match the weather and occupancy of 2023. The figures below show the updated progress for each year against the set target.

13.0 OUTDOOR POOL BUILDINGS

13.1 SCOPE AND BOUNDARY

For the purposes of this report, the City of Mississauga has 7 facilities/locations that fall under this category. They include:

- Applewood Heights - Outdoor Pool
- David Ramsey - Outdoor Pool
- Don McLean Westacres - Outdoor Pool
- Ron Lenyk Springfield Park - Erindale Outdoor Pool
- Lewis Bradley Park - Outdoor Pool
- Lions Club of Credit Valley Pool Building
- Streetsville - Outdoor Pool

The above listed locations have a total floor area of approximately 2,500 square meters. This would account for 0.5% of the total building area for City of Mississauga facilities included in this Plan.

13.2 BASELINE

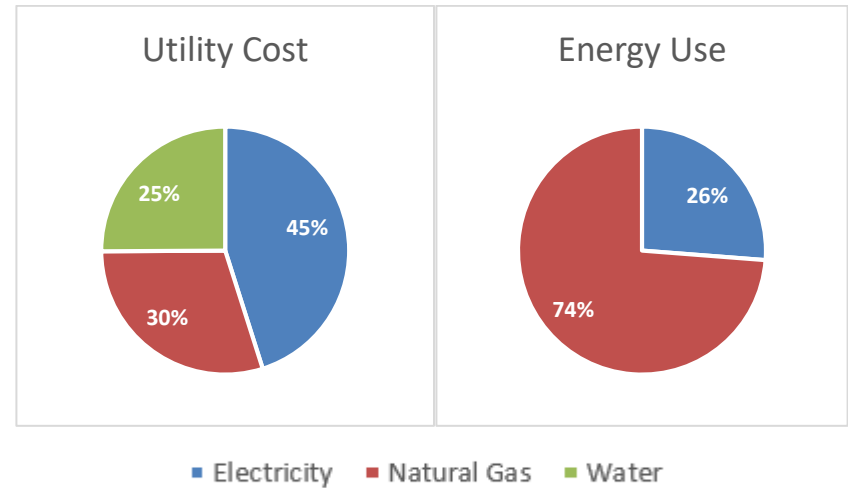
13.2.1 ENERGY USE

The energy use (combined electricity and natural gas) for **Outdoor Pool Buildings** was 2,219,000 equivalent kilowatt hours in 2023. Following are the key takeaways for the energy usage in 2023:

- 26% of the total energy usage was due to electricity use
- 74% of the total energy usage was due to natural gas use
- A total of \$204,000 in utility costs was incurred, out of which 45% is attributed to electricity, 30% to natural gas, and 25% to water

Outdoor Pool Buildings accounted for 1.0% of the City's total utility budget for 2023.

Figure 13-1: Utility Costs and Energy Use Breakdown for Outdoor Pool Buildings



13.2.2 ENERGY USE INTENSITY

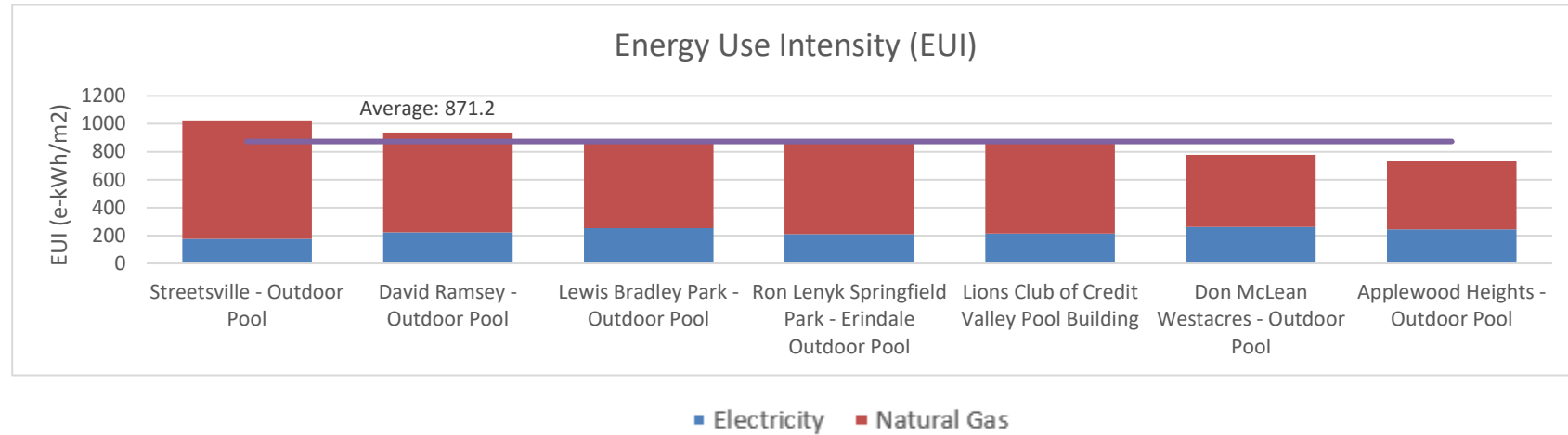
Energy Use Intensity (EUI) is a measurement that expresses a building's energy use as a function of its size or other characteristic. It is used to give a better picture of the energy efficiency of a facility. The lower the EUI, the more efficient the facility is.

When reviewing EUI, the facility operation type and hours should be taken into account. For example, a facility that operates 24 hours a day will most likely have a higher EUI than a similar one that operates 8 hours a day. Similarly, a facility that has high energy using systems that do not contribute to the building area, such as an outdoor pool or outdoor ice rink, will have a higher EUI than a facility where those systems are located within the facility, as they would add to the facility's area footprint.

For **Outdoor Pool Buildings** the average EUI in 2023 was 871.2 e-kWh/m².

The following chart shows the EUI for each facility within **Outdoor Pool Buildings**, and compares it to the average for the group.

Figure 13-2: Energy Use Intensity for Outdoor Pool Buildings



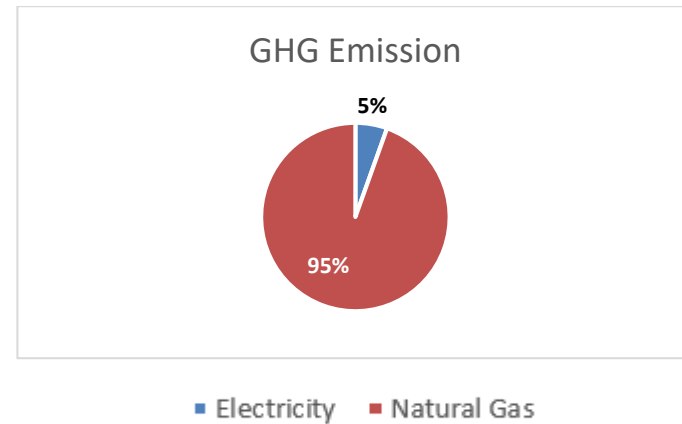
Note: The Average EUI value is calculated by taking the total energy use of all facilities, and dividing by the total area of the facilities. As such, a larger facility would have a bigger impact on the average than a smaller facility.

13.2.3 GREENHOUSE GAS (GHG) EMISSIONS

For 2023, **Outdoor Pool Buildings** emitted 317,600 kg (or 317 tonnes) of CO₂ in 2023. 5% of these emissions were due to the generation of electricity, while the use of natural gas accounted for the remaining 95%.

Outdoor Pool Buildings accounted for 1.6% of the City's total GHG emissions for facilities included in the plan.

Figure 13-3: GHG Emissions Breakdown for Outdoor Pool Buildings

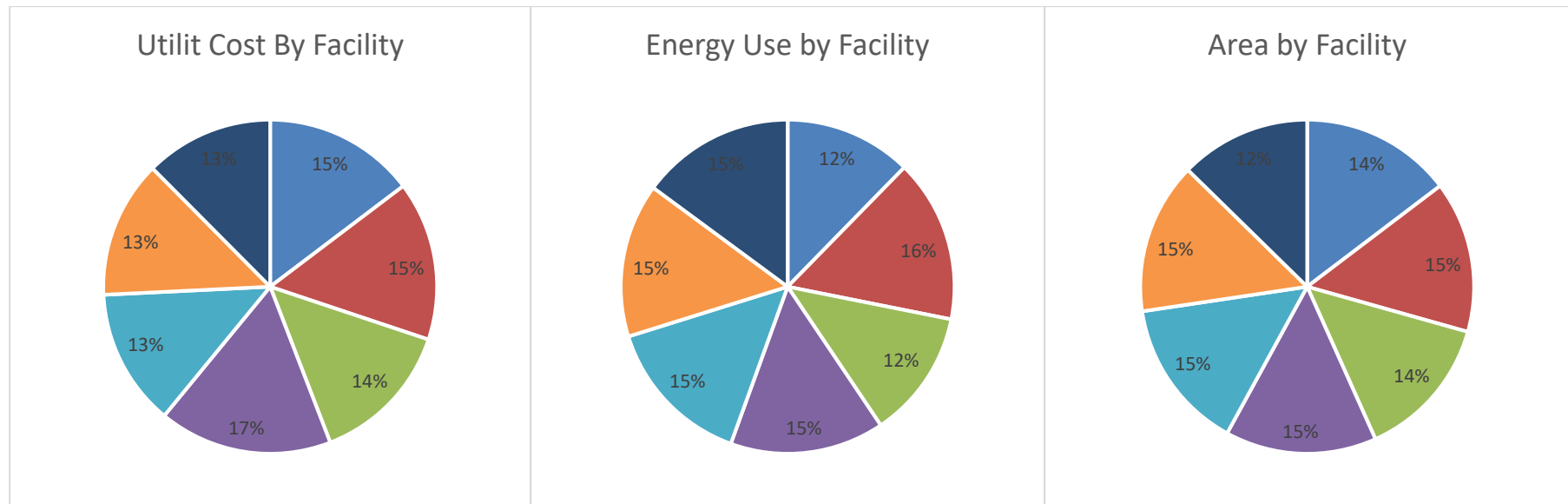


13.3 ENERGY AND GHG BREAKDOWN FOR OUTDOOR POOL BUILDINGS

This section provides a brief overview/recap of the Utility and GHG data for **Outdoor Pool Buildings**. The table below summarizes, by facility, the utility usage and GHG emissions for 2023. Following are the key takeaways:

- The seven (7) outdoor pool buildings represent the same floor area in the group, with Don McLean Westacres Outdoor Pool consuming the most energy due to the higher number of bathers experienced at the facility

Figure 12-4: Utility Costs and Energy Use Breakdown by Facility



- Applewood Heights - Outdoor Pool
- David Ramsey - Outdoor Pool
- Don McLean Westacres - Outdoor Pool
- Lewis Bradley Park - Outdoor Pool
- Lions Club of Credit Valley Pool Building
- Ron Lenyk Springfield Park - Erindale Outdoor Pool
- Streetsville - Outdoor Pool

2023 Annual Report for Outdoor Pool Buildings

Facility	Area	Electricity		Natural Gas		Total Energy	Water		Total Costs	GHG Emissions
	m ²	kWh	\$	m ³	\$	e-kWh	m ³	\$	\$	kg
Applewood Heights - Outdoor Pool	374	91,682	14,632	17,337	\$6,765	273,721	3,457	\$8,680	\$30,078	36,055
David Ramsey - Outdoor Pool	374	83,562	13,336	25,449	\$9,930	350,777	3,306	\$8,301	\$31,568	51,394
Don McLean Westacres - Outdoor Pool	355	92,466	14,758	17,496	\$6,827	276,174	2,821	\$7,083	\$28,668	36,384
Lewis Bradley Park - Outdoor Pool	374	94,462	15,076	22,627	\$8,829	332,046	4,180	\$10,496	\$34,401	46,300
Lions Club of Credit Valley Pool Building	374	80,417	12,835	23,309	\$9,095	325,162	2,090	\$5,248	\$27,178	47,189
Ron Lenyk Springfield Park - Erindale Outdoor Pool	374	78,718	12,563	24,034	\$9,378	331,075	2,110	\$5,298	\$27,239	48,531
Streetsville - Outdoor Pool	323	56,956	9,090	26,079	\$10,176	330,786	2,480	\$6,227	\$25,493	51,806
Totals	2,548	578,263	92,291	156,331	\$61,000	2,219,739	20,444	\$51,333	\$204,624	317,660
Usage / Costs per m²:		226.9	36.2	61.4	23.9	871.2	8.0	20.1	80.3	124.7

13.4 ACTION PLAN

No action plan has been identified with the goal to save on electricity, natural gas, oil, and/or other form of energy consumption due to the historic and heritage-designation of the facilities in this group.

13.5 ESTIMATED SAVINGS

Since no action plan has been identified for outdoor pool buildings. There will be no expected savings.

14.0 PARKS AND SPORTS FIELDS

14.1 SCOPE AND BOUNDARY

For the purposes of this report, the City of Mississauga has 218 facilities/locations that fall under this category. The group has a total floor area of approximately 13,387 square meters. This would account for 2.9% of the total building area for City of Mississauga facilities included in this Plan.

14.2 BASELINE

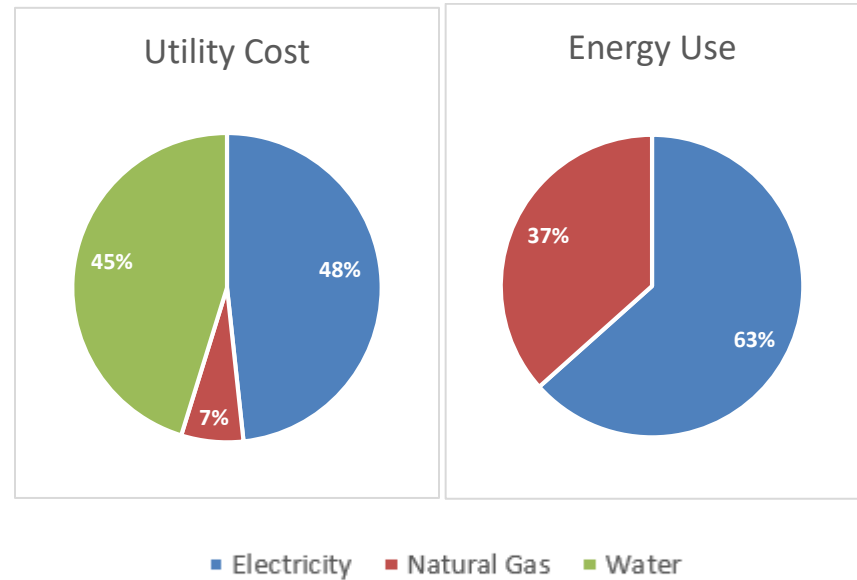
14.2.1 ENERGY USE

The energy use (combined electricity and natural gas) for **Parks and Sports Fields** was 9,078,932 equivalent kilowatt hours in 2023. Following are the key takeaways for the energy usage in 2023:

- 63% of the total energy usage was due to electricity use
- 37% of the total energy usage was due to natural gas use
- A total of \$1,902,000 in utility costs was incurred, out of which 48% is attributed to electricity , 7% to natural gas and 45% to water

Parks and Sports Fields accounted for 9.6% of the City's total utility budget for 2023.

Figure 14-1: Utility Costs and Energy Use Breakdown for Parks and Sports Fields



14.2.2 ENERGY USE INTENSITY

Energy Use Intensity (EUI) is a measurement that expresses a building's energy use as a function of its size or other characteristic. It is used to give a better picture of the energy efficiency of a facility. The lower the EUI, the more efficient the facility is.

When reviewing EUI, the facility operation type and hours should be taken into account. For example, a facility that operates 24 hours a day will most likely have a higher EUI than a similar one that operates 8 hours a day. Similarly, a facility that has high energy using systems that do not contribute to the building area, such as an outdoor pool or outdoor ice rink, will have a higher EUI than a facility where those systems are

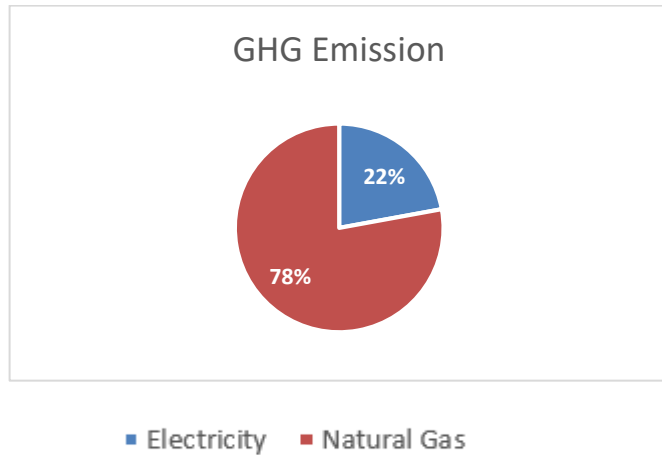
located within the facility, as they would add to the facility's area footprint. For **Parks and Sports Fields** the average EUI in 2023 was 678 e-kWh/m².

14.2.3 GREEN HOUSE GAS (GHG) EMISSIONS

For 2023, **Parks and Sports Fields** emitted 780,624 kg (or 781 tonnes) of CO₂ in 2023. 22% of these emissions were due to the generation of electricity, while the use of natural gas accounted for the remaining 78%.

Parks and Sports Fields accounted for 3.9% of the City's total GHG emissions for facilities included in the plan. 218
Figure 14-2: GHG Emissions Breakdown for Parks and Sports Fields

Figure 12-4: Utility Costs and Energy Use Breakdown by Facility



2023 Annual Report for Parks and Sports Fields

Facility	# Facilities	Area m ²	Electricity		Natural Gas		Total Energy e-kWh	Water		Total Costs \$	GHG Emissions kg
			kWh	\$	m ³	\$		m ³	\$		
Parks and Sports Fields	218	13,387	5,755,965	\$918,652	316,473	\$123,488	9,078,932	342,577	\$860,177	\$1,902,316	780,624
Usage / Costs per m²:			429.97	68.62	23.64	9.22	678.19	25.59	64.25	142.10	58.31

15.0 TRAFFIC AND STREET LIGHTING

15.1 SCOPE AND BOUNDARY

For the purposes of this report, the City of Mississauga has 7 facilities/locations that fall under this category. They include:

- Bus Shelters
- Decorative Bridge Lighting
- Gateway Lighting Feature
- Street Lighting
- Street Lighting - LED
- Traffic Bollards
- Traffic Signals

The above listed locations have a total floor area of approximately 0 square meters. This would account for 0.0% of the total building area for City of Mississauga facilities included in this Plan.

15.2 BASELINE

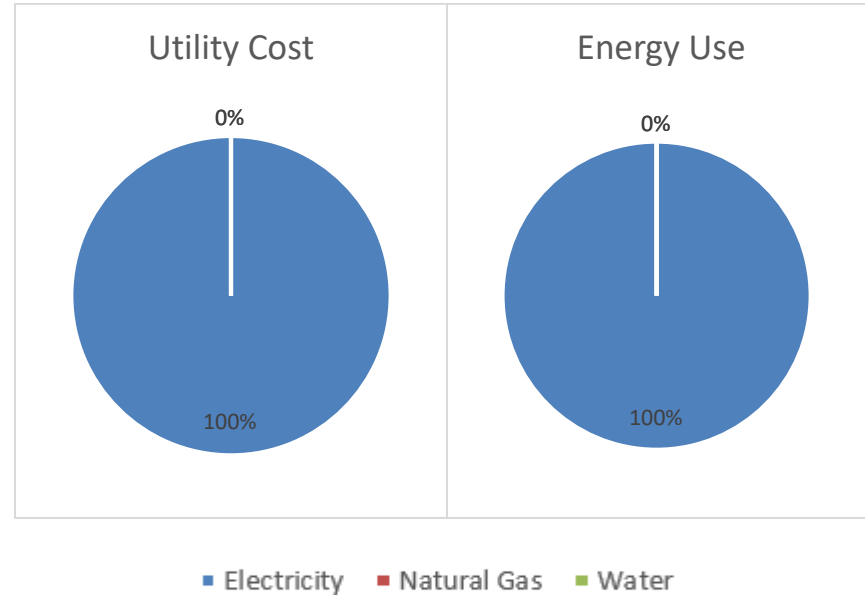
15.2.1 ENERGY USE

The energy use (combined electricity and natural gas) for **Traffic and Street Lighting** was 15,913,000 equivalent kilowatt hours in 2023. Following are the key takeaways for the energy usage in 2023:

- 100% of the total energy usage was due to electricity use
- A total of \$2,540,000 in utility costs was incurred, out of which 100% is attributed to electricity

Traffic and Street Lighting accounted for 12.8% of the City's total utility budget for 2023.

Figure 15-1: Utility Costs and Energy Use Breakdown for Traffic and Street Lighting

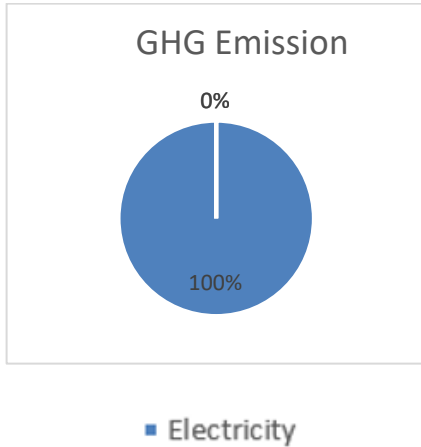


15.2.2 GREENHOUSE GAS (GHG) EMISSIONS

For 2023, **Traffic and Street Lighting** emitted 477,000 kg (or 477 tonnes) of CO2 in 2023. 100.0% of these emissions were due to the generation of electricity, while the use of natural gas accounted for the remaining 0.0%.

Traffic and Street Lighting accounted for 2.4% of the City's total GHG emissions for facilities included in the plan.

Figure 15-2: GHG Emissions Breakdown for Traffic and Street Lighting

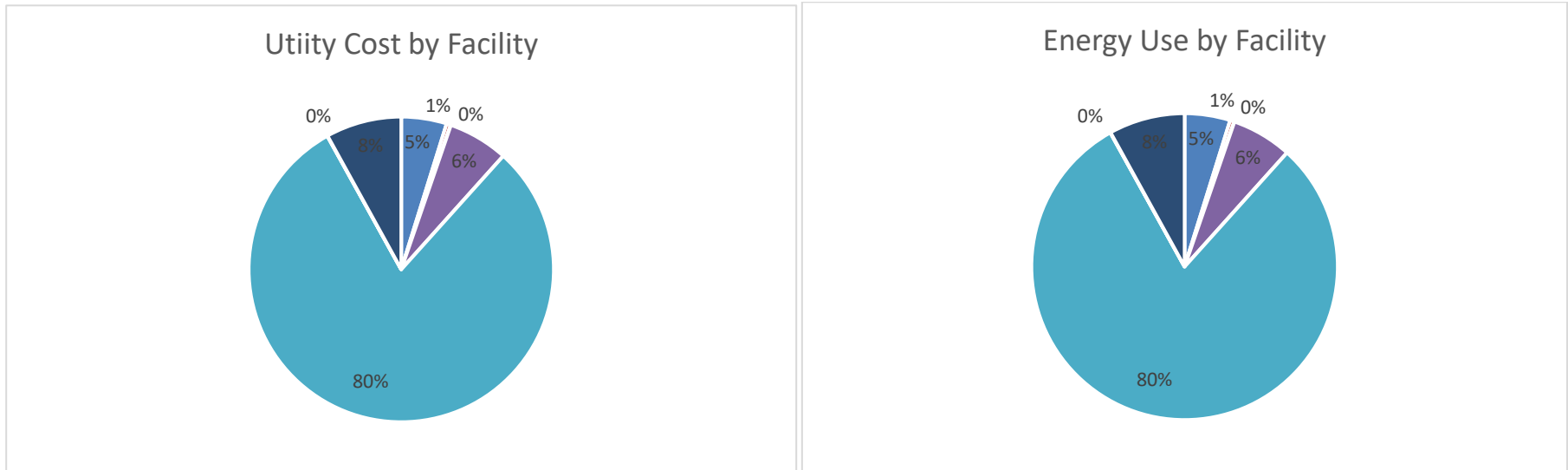


15.3 ENERGY AND GHG BREAKDOWN FOR TRAFFIC AND STREET LIGHTING

This section provides a brief overview/recap of the Utility and GHG data for **Traffic and Street Lighting**. The table below summarizes, by facility, the utility usage and GHG emissions for 2023. Following are the key takeaways:

- Street Lighting is the largest energy and utility consumer in the group, with the bus shelters and traffic signals as the next largest energy and utility consumers in the group

Figure 12-4: Utility Costs and Energy Use Breakdown by Facility



■ Bus Shelters ■ Decorative Bridge Lighting ■ Gateway Lighting Feature ■ Street Lighting ■ Street Lighting - LED ■ Traffic Bollards ■ Traffic Signals

2023 Annual Report for Traffic and Street Lighting

Facility	Area	Electricity		Natural Gas		Total Energy	Water		Total Costs	GHG Emissions
	m ²	kWh	\$	m ³	\$	e-kWh	m ³	\$	\$	kg
Bus Shelters	0	765,655	\$122,199	0	\$0	765,655	0	\$0	\$122,199	22,970
Decorative Bridge Lighting	0	71,148	\$11,355	0	\$0	71,148	0	\$0	\$11,355	2,134
Gateway Lighting Feature	0	3,674	\$586	0	\$0	3,674	0	\$0	\$586	110
Street Lighting	0	1,015,635	\$162,095	0	\$0	1,015,635	0	\$0	\$162,095	30,469
Street Lighting - LED	0	12,773,785	\$2,038,696	0	\$0	12,773,785	0	\$0	\$2,038,696	383,214
Traffic Bollards	0	4,509	\$720	0	\$0	4,509	0	\$0	\$720	135
Traffic Signals	0	1,278,867	\$204,107	0	\$0	1,278,867	0	\$0	\$204,107	38,366
Totals	0	15,913,273	\$2,539,758	0	\$0	15,913,273	0	\$0	\$2,539,758	477,398
Usage / Costs per m ² :	-	-	-	-	-	-	-	-	-	-

16.0 TRANSIT AND ASSOCIATED FACILITIES

16.1 SCOPE AND BOUNDARY

For the purposes of this report, the City of Mississauga has 15 facilities/locations that fall under this category. They include:

- Cawthra Road Station
- CCTT Transitway Terminal
- Central Parkway Station
- City Centre Transit Terminal
- Dixie Rd Station
- Etobicoke Creek Station
- Go Bus Stop
- Malton Satellite Terminal
- Semenyk Crt - T&W Administration-TEP
- Spectrum Way Station
- Tahoe Blvd Station
- Tomken Rd Station
- Edward J. Dowling Transit Facility (Bldg ABCD)
- Transit Central - New Bus Storage Building (Bldg E)
- Transit Central - Body Shop (Bldg F)

The above listed locations have a total floor area of approximately 54,717 square meters. This would account for 11.7% of the total building area for City of Mississauga facilities included in this Plan.

16.2 BASELINE

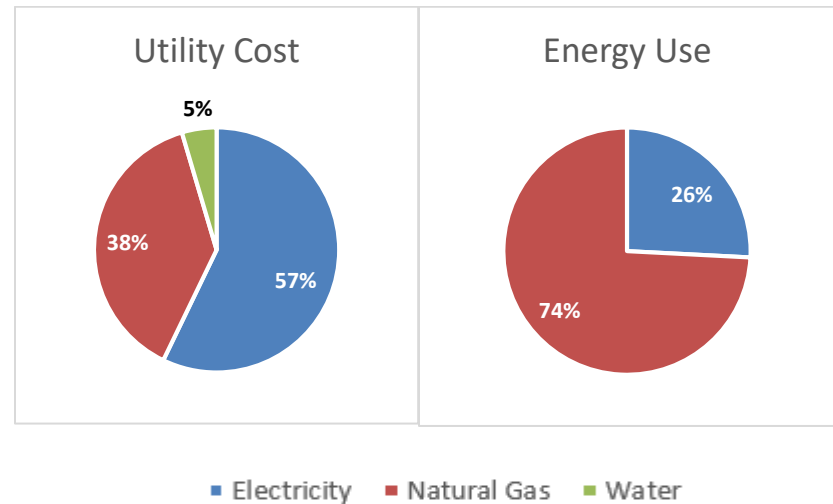
16.2.1 ENERGY USE

The energy use (combined electricity and natural gas) for **Transit and Associated Facilities** was 30,497,695 equivalent kilowatt hours in 2023. Following are the key takeaways for the energy usage in 2023:

- 26% of the total energy usage was due to electricity use
- 74% of the total energy usage was due to natural gas use
- A total of \$2,198,000 in utility costs was incurred, out of which 57% is attributed to electricity, 38% to natural gas, and 5% to water

Transit and Associated Facilities accounted for 11.0% of the City's total utility budget for 2023.

Figure 16-1: Utility Costs and Energy Use Breakdown for Transit and Associated Facilities



16.2.2 ENERGY USE INTENSITY

Energy Use Intensity (EUI) is a measurement that expresses a building's energy use as a function of its size or other characteristic. It is used to give a better picture of the energy efficiency of a facility. The lower the EUI, the more efficient the facility is.

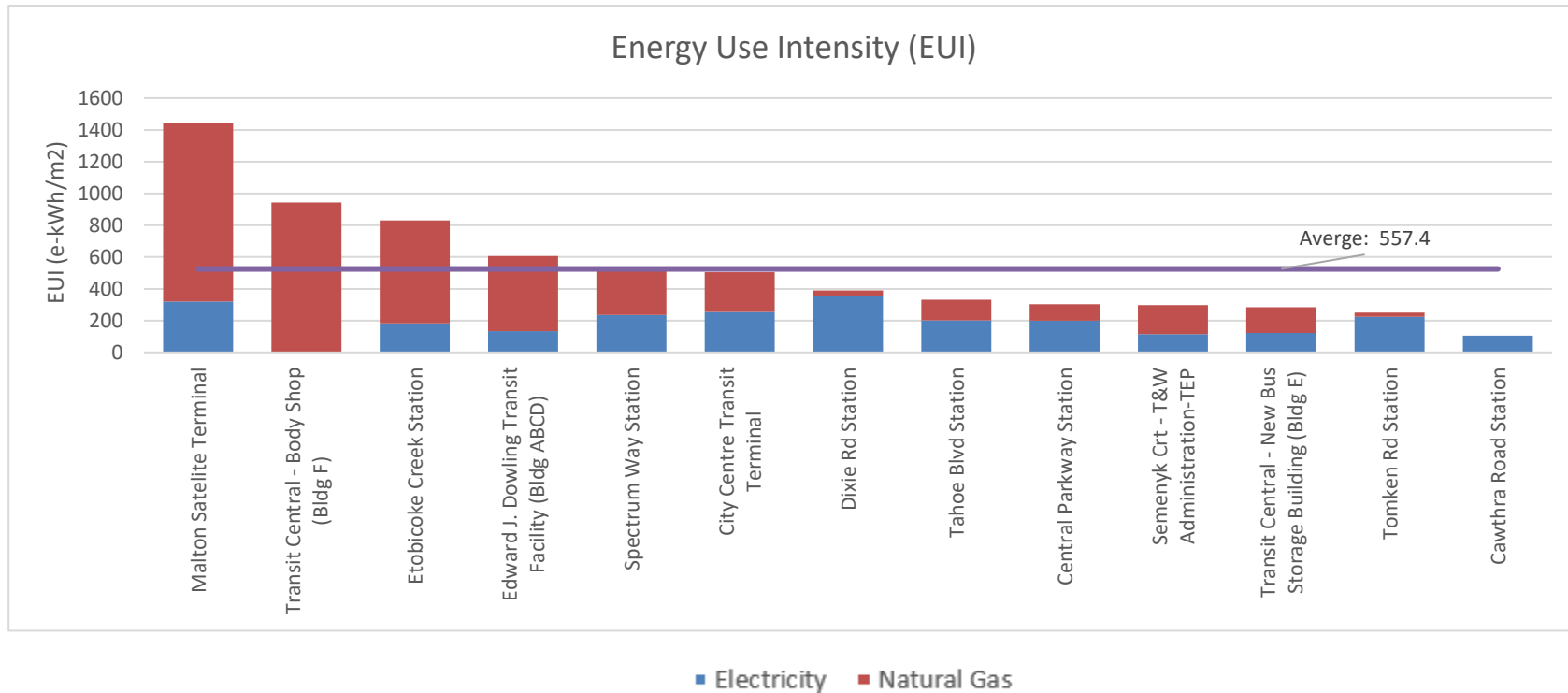
When reviewing EUI, the facility operation type and hours should be taken into account. For example, a facility that operates 24 hours a day will most likely have a higher EUI than a similar one that operates 8 hours a day. Similarly, a facility that has high energy using systems that do not contribute to the building area, such as an outdoor pool or outdoor ice rink, will have a higher EUI than a facility where those systems are located within the facility, as they would add to the facility's area footprint.

For **Transit and Associated Facilities** the average EUI in 2023 was 557.4 e-kWh/m².

The following chart shows the EUI for each facility within **Transit and Associated Facilities**, and compares it to the average for the group.

Note: The Average EUI value is calculated by taking the total energy use of all facilities, and dividing by the total area of the facilities. As such, a larger facility would have a bigger impact on the average than a smaller facility.

Figure 16-2: Energy Use Intensity for Transit and Associated Facilities

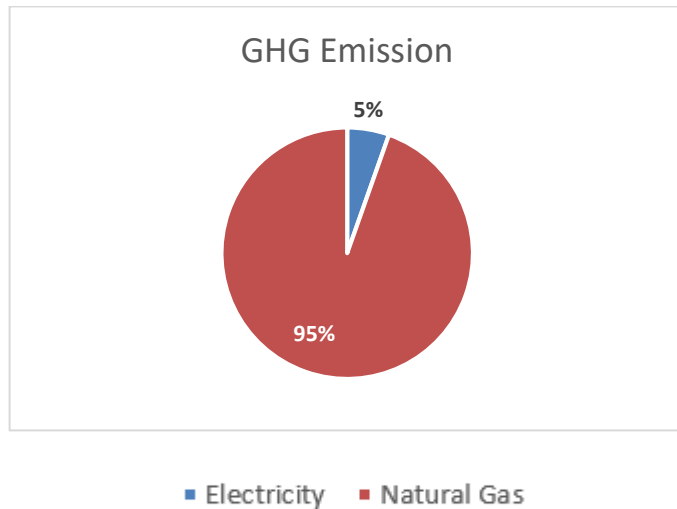


16.2.3 GREENHOUSE GAS (GHG) EMISSIONS

For 2023, **Transit and Associated Facilities** emitted 4,375,421 kg (or 4,375 tonnes) of CO₂ in 2023. 5.0% of these emissions were due to the generation of electricity, while the use of natural gas accounted for the remaining 95.0%.

Transit and Associated Facilities accounted for 21.7% of the City's total GHG emissions for facilities included in the plan.

Figure 16-3: GHG Emissions Breakdown for Transit and Associated Facilities

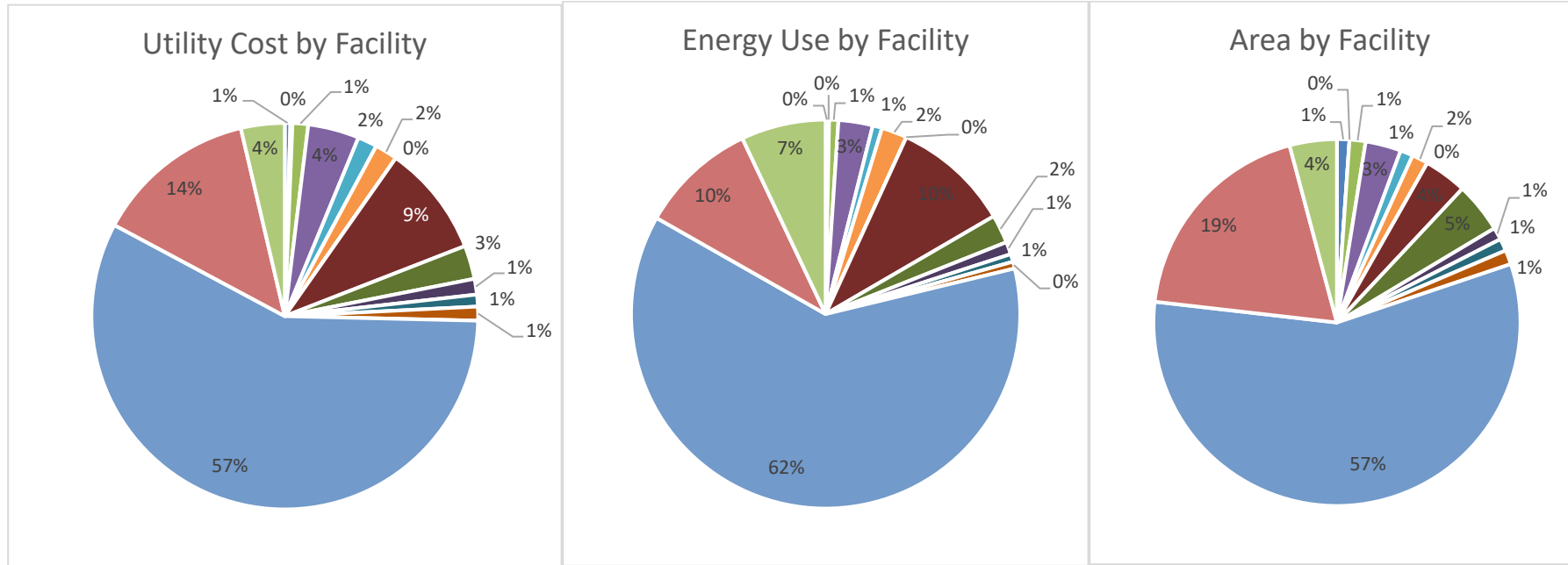


16.3 ENERGY AND GHG BREAKDOWN FOR TRANSIT AND ASSOCIATED FACILITIES

This section provides a brief overview/recap of the Utility and GHG data for **Transit and Associated Facilities**. The table below summarizes, by facility, the utility usage and GHG emissions for 2023. Following are the key takeaways:

- The Transit Central campus consisting of Edward J Dowling Transit Facility (Bldg ABCD), New Bus Storage Building (Bldg E) and Body Shop (Bldg F) is by far the largest facility in this group by area and represents the largest energy consumption (79%) and utility consumption (75%) in this group
- The following stations were removed from the City of Mississauga portfolio: Orbitor Drive Station and Transit Drivers Lounge & WC
- Natural gas-fired space heating loads dominate the energy usage in this group, major renovation project was completed in 2023 to reduce the gas consumption in Transit facilities
- For this reason, priority was given to reduce the electrical consumption in the next 5 years.

Figure 16-4: Utility Costs and Energy Use Breakdown by Facility



- Cawthra Road Station
- CCTT Transitway Terminal
- Central Parkway Station
- City Centre Transit Terminal
- Dixie Rd Station
- Etobicoke Creek Station
- Go Bus Stop
- Malton Satellite Terminal
- Semenyk Crt - T&W Administration-TEP
- Spectrum Way Station
- Tahoe Blvd Station
- Tomken Rd Station
- Edward J. Dowling Transit Facility (Bldg ABCD)
- Transit Central - New Bus Storage Building (Bldg E)
- Transit Central - Body Shop (Bldg F)

2023 Annual Report for Transit and Associated Facilities

Facility	Area	Electricity		Natural Gas		Total Energy	Water		Total Costs	GHG Emissions
	m ²	kWh	\$	m ³	\$	e-kWh	m ³	\$	\$	kg
Cawthra Road Station	600	63,417	\$10,121	0	\$0	63,417	0	\$0	\$10,121	1,903
CCTT Transitway Terminal	0	23,845	\$3,806	0	\$0	23,845	0	\$0	\$3,806	715
Central Parkway Station	773	153,801	\$24,547	7685	\$2,999	234,494	514	\$1,291	\$28,836	19,377
City Centre Transit Terminal	1,718	437,032	\$69,750	41,054	\$16,019	868,099	3,296	\$8,276	\$94,046	91,976
Dixie Rd Station	614	216,678	\$34,582	2,213	\$864	239,915	84	\$211	\$35,656	10,752
Etobicoke Creek Station	781	142,202	\$22,695	48,192	\$18,805	648,218	11	\$28	\$41,528	96,843
Go Bus Stop	0	559	\$89	0	\$0	559	0	\$0	\$89	17
Malton Satellite Terminal	2070	661828	\$105,628	221,288	\$86,347	2,985,352	5358	\$13,453	\$205,428	444,949
Semenyk Crt - T&W Administration-TEP	2,422	280,686	\$44,797	42,062	\$16,413	722,337	214	\$537	\$61,747	89,222
Spectrum Way Station	591	138,838	\$22,159	17,042	\$6,650	317,779	27	\$68	\$28,876	36,903
Tahoe Blvd Station	591	119,023	\$18,996	7,329	\$2,860	195,978	9	\$23	\$21,878	17,650
Tomken Rd Station	693	155,003	\$24,738	1,802	\$703	173,924	73	\$183	\$25,625	8,112
Edward J. Dowling Transit Facility (Bldg ABCD)	31,178	4,199,712	\$670,274	1,400,985	\$546,664	18,910,055	18,190	\$45,673	\$1,262,612	2,817,284
Transit Central - New Bus Storage Building (Bldg E)	10,412	1,280,248	\$204,328	160,591	\$62,663	2,966,454	12,046	\$30,246	\$297,236	346,903
Transit Central - Body Shop (Bldg F)	2,274	0	\$0	204,502	\$79,797	2,147,271	228	\$572	\$80,369	392,848
Totals	54,717	7,872,872	\$1,256,510	2,154,745	\$840,781	30,497,695	40,050	\$100,562	2,197,853	4,375,451
Usage / Costs per m²:		143.9	23.0	39.4	15.4	557.4	0.7	1.8	40.2	80.0

16.4 ACTION PLAN

An action plan has been identified with the goal to save on electricity, natural gas, oil, and/or other form of energy consumption within a facility or location.

The following figure shows the various projects and initiatives that have been planned for **Transit and Associated Facilities**. The chart shows what projects have been planned, when they are planned to be implemented, and the progress of implementation (if applicable). A brief description of each project has been noted below:

- **Ongoing Commissioning:** Conduct regular commissioning to the city's high consuming building using the data analytics/fault detection tools that collects, manages, and analyzes data from various building systems, to identify operation irregularities and ensure optimum operation.
- **Controls Upgrades:** Includes controller upgrades, optimized sequence of operations, and additional points to better manage and control building systems






- **Renewable Energy Generation:** Includes energy generation from renewable sources like solar photovoltaics, solar hot water heating, solar lighting

For the chart below, the **Orange** coloured bars represent the original planned start and completion of a Measure type. The **Green** bar beneath shows the actual start and completion times for a completed measure, while the **Blue** bar shows the actual start time of a Measure that is currently being implemented, but not yet complete. Some Notes:

- A Single Measure timeline may include more than one implementation of that measure (example: In different facilities).
- Due to changing circumstances (change in operations, budget changes, new technology, etc.), a planned measure may be cancelled. These would be indicated by a **Red** plan bar on the chart

Figure 16-5: Energy Measure Implementation Plan for Transit and Associated Facilities

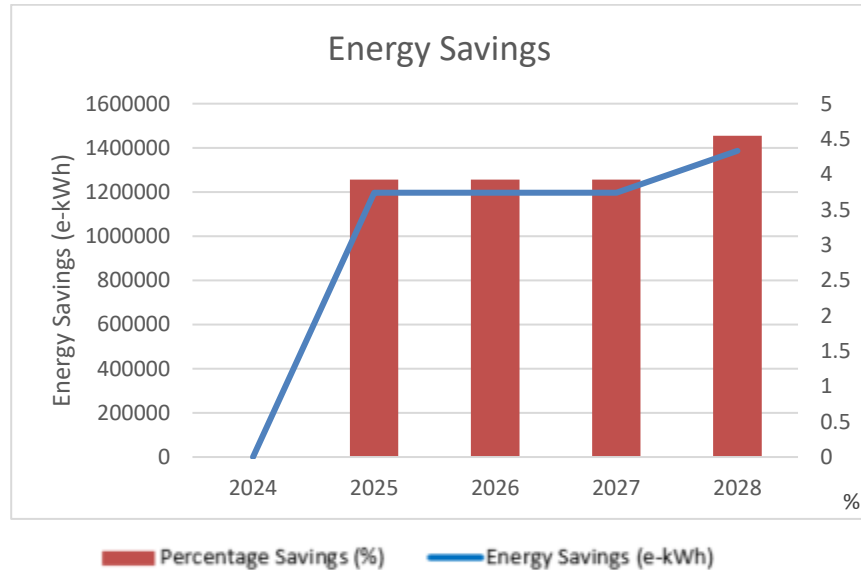
Energy Measure Implementation Plan for Transit and Associated Facilities

Energy Measure	2024				2025				2026				2027				2028			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Building Ongoing Commissioning	Planned Implementation																			
Control upgrade	Scheduled Implementation																			
Renewable Energy Generation	Planned Implementation																			
Planned Implementation  Scheduled Implementation  Cancelled Implementation 																Q1 = Jan - Mar Q2 = Apr - Jun				
Community Cent  Status = Completed  Status = Underway																Q3 = Jul - Sep Q4 = Oct - Dec				

16.5 ESTIMATED SAVINGS

At the end of the plan, **Transit and Associated Facilities** are expected to save 4.55% over the base year of 2023.

Figure 16-6: Energy Measure Annual Savings for Transit and Associated Facilities



consumption data. Therefore, actual consumption data for each year starting 2024 will be adjusted to match the weather and occupancy of 2023. The figures below show the updated progress for each year against the set target.

16.6 PROGRESS TO TARGETS

The City is targeting a 4.55% reduction in energy use in **Transit and Associated Facilities** by 2028 over the base year, 2023. The reporting of energy consumption data and savings for **Transit and Associated Facilities** will be based on utility meters and assembled annually. Since utility meters monitor energy consumption for the entire facility, the measurement boundary will encompass all parts of the facility. To determine the savings and fairly compare year-to-year energy consumption data, it is important to account for independent variables such as weather and occupancy and apply regression analysis to

17.0 SERVICE YARDS, CENTRAL STORES, AND MAINTENANCE FACILITIES

17.1 SCOPE AND BOUNDARY

For the purposes of this report, the City of Mississauga has 7 facilities/locations that fall under this category. They include:

- Clarkson Yard
- Lakefront Promenade Maintenance Depot
- Malton Yard
- Mavis Maintenance Hut
- Mavis North
- Mavis South
- Meadowvale Depot

The above listed locations have a total floor area of approximately 15,750 square meters. This would account for 3.4% of the total building area for City of Mississauga facilities included in this Plan.

17.2 BASELINE

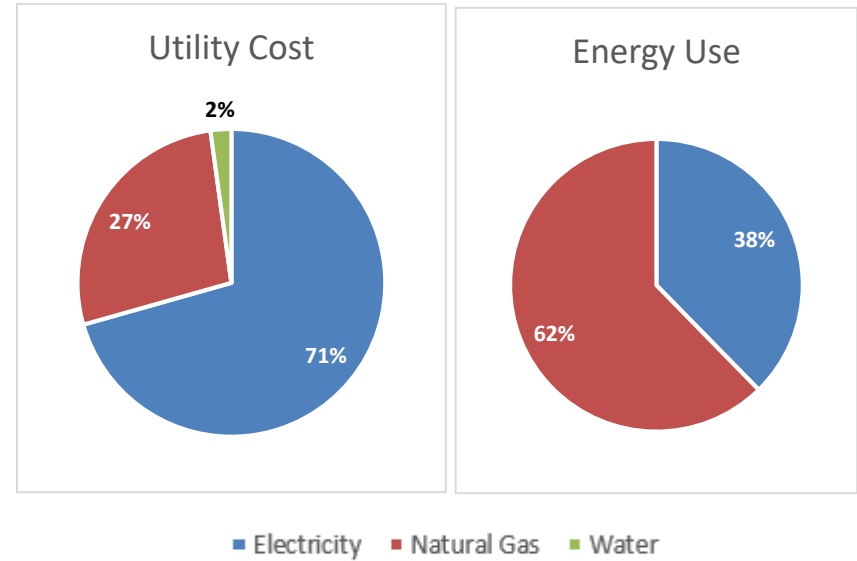
17.2.1 ENERGY USE

The energy use (combined electricity and natural gas) for **Service Yards, Central Stores, and Maintenance Facilities** was 5,419,000 equivalent kilowatt hours in 2023. Following are the key takeaways for the energy usage in 2023:

- 38% of the total energy usage was due to electricity use
- 62% of the total energy usage was due to natural gas use
- A total of \$461,000 in utility costs was incurred, out of which 71% is attributed to electricity, 27% to natural gas, and 2% to water

Service Yards, Central Stores, and Maintenance Facilities accounted for 2.3% of the City's total utility budget for 2023.

Figure 17-1: Utility Costs and Energy Use Breakdown for Service Yards, Central Stores, and Maintenance Facilities



17.2.2 ENERGY USE INTENSITY

Energy Use Intensity (EUI) is a measurement that expresses a building's energy use as a function of its size or other characteristic. It is used to give a better picture of the energy efficiency of a facility. The lower the EUI, the more efficient the facility is.

When reviewing EUI, the facility operation type and hours should be taken into account. For example, a facility that operates 24 hours a day will most likely have a higher EUI than a similar one that operates 8 hours a day. Similarly, a facility that has high energy using systems that do not contribute to the building area, such as an outdoor pool or outdoor ice rink, will have a higher EUI than a facility where those systems are

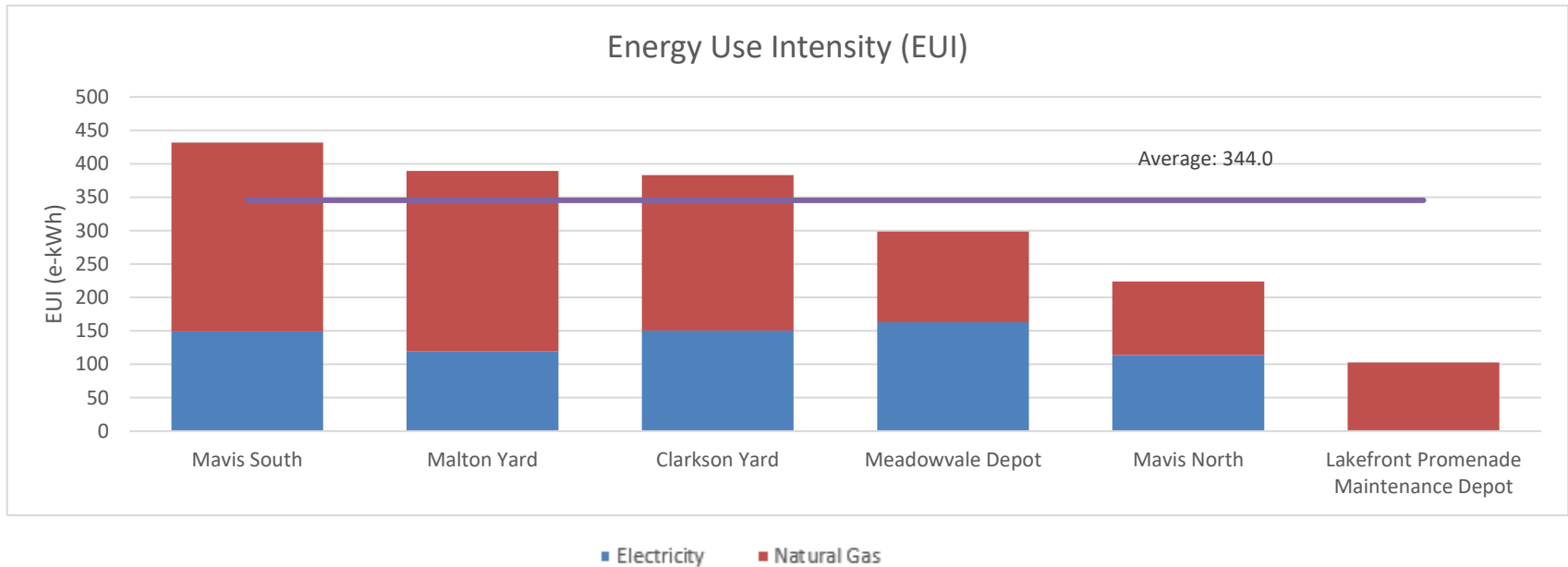
located within the facility, as they would add to the facility's area footprint.

For **Service Yards, Central Stores, and Maintenance Facilities** the average EUI in 2023 was 344 e-kWh/m².

The following chart shows the EUI for each facility within **Service Yards, Central Stores, and Maintenance Facilities**, and compares it to the average for the group.

Note: The Average EUI value is calculated by taking the total energy use of all facilities, and dividing by the total area of the facilities. As such, a larger facility would have a bigger impact on the average than a smaller facility.

Figure 17-2: Energy Use Intensity for Service Yards, Central Stores, and Maintenance Facilities

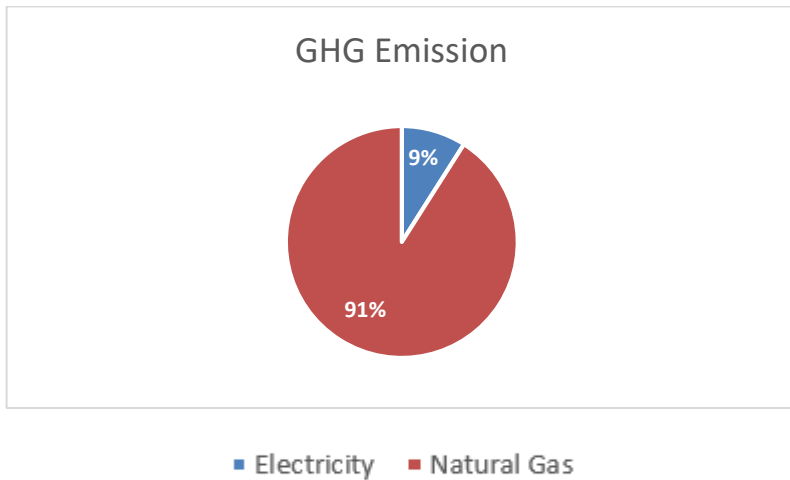


17.2.3 GREENHOUSE GAS (GHG) EMISSIONS

For 2023, **Service Yards, Central Stores, and Maintenance Facilities** emitted 679,400 kg (or 679 tonnes) of CO₂ in 2023. 9.0% of these emissions were due to the generation of electricity, while the use of natural gas accounted for the remaining 91.0%.

Service Yards, Central Stores, and Maintenance Facilities accounted for 3.4% of the City's total GHG emissions for facilities included in the plan.

Figure 17-3: GHG Emissions Breakdown for Service Yards, Central Stores, and Maintenance Facilities

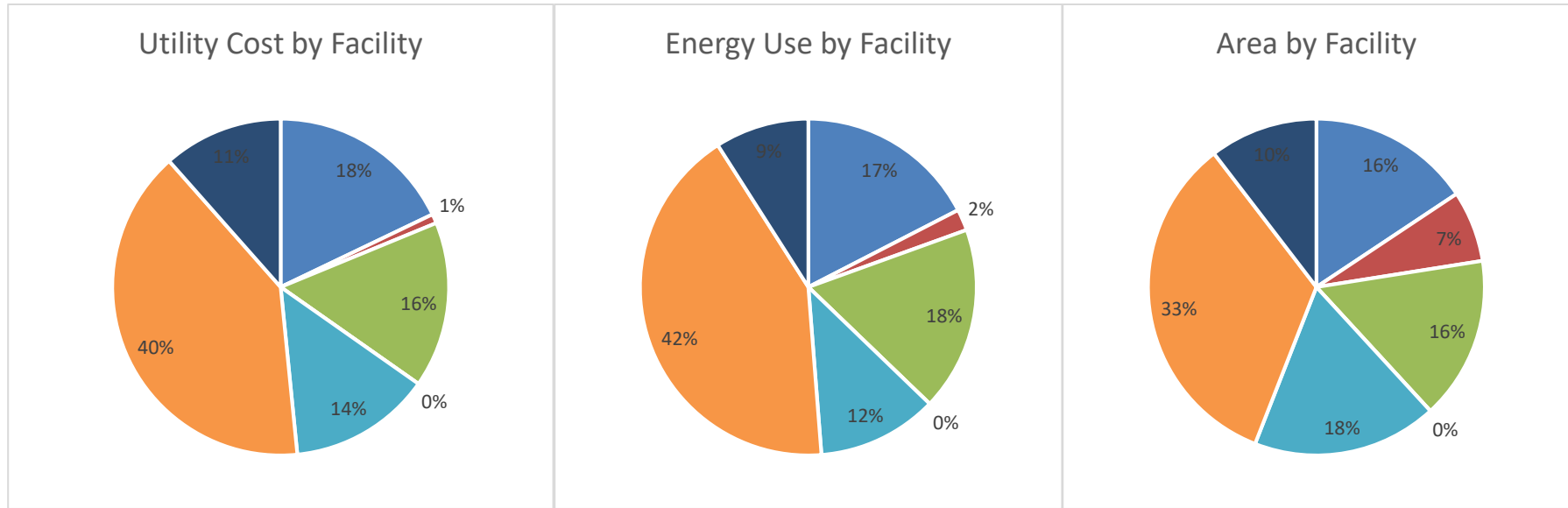


17.3 ENERGY AND GHG BREAKDOWN FOR SERVICE YARDS, CENTRAL STORES, AND MAINTENANCE FACILITIES

This section provides a brief overview/recap of the Utility and GHG data for **Service Yards, Central Stores, and Maintenance Facilities**. The table below summarizes, by facility, the utility usage and GHG emissions for 2013. Following are the key takeaways:

- The Mavis Yards are the largest facility in this group by area and contribute 54% and 54% towards energy consumption and utility consumption in this group
- The Clarkson Yard is the second largest facility in this group by area and contribute 17% and 18% towards energy consumption and utility consumption in this group
- The Malton Yard is the third largest facility in this group by area and contribute 18% and 16% towards energy consumption and utility consumption in this group
- Meadowvale Depot and Lakefront Promenade Maintenance Depot represent the remaining facility area in the group and contribute 11% and 13% towards the energy consumption and utility consumption in the group

Figure 17-4: Utility Costs and Energy Use Breakdown by Facility



■ Clarkson Yard ■ Lakefront Promenade Maintenance Depot ■ Malton Yard ■ Mavis Maintenance Hut ■ Mavis North ■ Mavis South ■ Meadowvale Depot

2023 Annual Report for Service Yards, Central Stores, and Maintenance Facilities

Facility	Area	Electricity		Natural Gas		Total Energy	Water		Total Costs	GHG Emissions
	m ²	kWh	\$	m ³	\$	e-kWh	m ³	\$	\$	kg
Clarkson Yard	2,466	371,092	59,226	54,664	21,330	945,064	796	1,999	82,555	116,142
Lakefront Promenade Maintenance Depot	1,078	-	-	10,546	4,115	110,733	-	-	4,115	20,259
Malton Yard	2,466	293,457	46,836	63,461	24,762	959,798	819	2,056	73,655	130,712
Mavis Maintenance Hut	0	-	-	-	-	-	-	-	-	-
Mavis North	2,799	318,373	50,812	29,351	11,453	626,559	324	814	63,079	65,934
Mavis South	5,299	791,673	126,351	142,419	55,572	2,287,073	1,154	2,898	184,820	297,337
Meadowvale Depot	1,640	266,933	42,603	21,234	8,286	489,890	918	2,305	53,193	48,799
Totals	15,748	2,041,528	325,828	321,675	125,518	5,419,116	4,011	10,071	461,417	679,184
Usage / Costs per m²:		130	21	20	8	344	0	1	29	43

17.4 ACTION PLAN

An action plan has been identified with the goal to save on electricity, natural gas, oil, and/or other form of energy consumption within a facility or location.

The following figure shows the various projects and initiatives that have been planned for **Indoor Ice Arenas**. The chart shows what projects have been planned, when they are planned to be implemented, and the progress of implementation (if applicable). A brief description of each project has been noted below:

- **Ongoing Commissioning:** Conduct regular commissioning to the city's high consuming building using the data analytics/fault detection tools that collects, manages, and analyzes data from various building systems, to identify operation irregularities and ensure optimum operation.
- **HVAC Systems Energy Upgrades for Lifecycle Replacements:** Includes energy upgrades for HVAC equipment that show energy & GHG emission savings.
- **DHW Systems Energy Upgrades for Lifecycle Replacements:** Includes energy upgrades for DHW equipment that show energy & GHG emission savings.
- **Controls Upgrades:** Includes controller upgrades, optimized sequence of operations, and additional points to better manage and control building systems
- **Lighting Upgrades:** Includes replacement of existing lighting technologies to newer technologies like LEDs, and better controls through localized sensors and BAS scheduling





- **Operation Optimization:** Add additional sensors such as CO₂ sensors and motion sensors to optimize the operation of HVAC units to satisfy the occupant needs.

For the chart below, the **Orange** coloured bars represent the original planned start and completion of a Measure type. The **Green** bar beneath shows the actual start and completion times for a completed measure, while the **Blue** bar shows the actual start time of a Measure that is currently being implemented, but not yet complete. Some Notes:

- A Single Measure timeline may include more than one implementation of that measure (example: In different facilities).
- Due to changing circumstances (change in operations, budget changes, new technology, etc.), a planned measure may be cancelled. These would be indicated by a **Red** plan bar on the chart.

Figure 17-5: Energy Measure Implementation Plan for Service Yards, Central Stores, and Maintenance Facilities

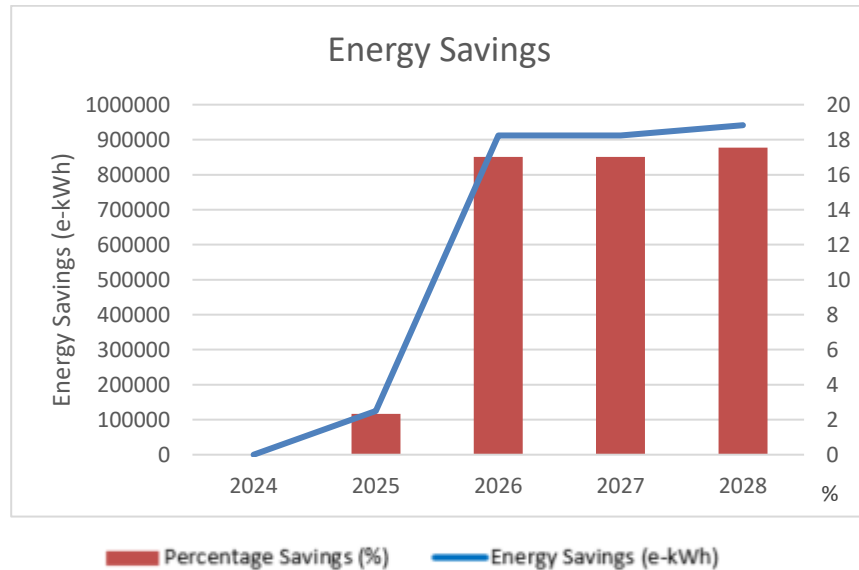
Energy Measure Implementation Plan for Service Yards & Maintenance Dept

Energy Measure	2024				2025				2026				2027				2028				
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Building Ongoing Commissioning	Scheduled Implementation				Scheduled Implementation				Scheduled Implementation				Scheduled Implementation				Scheduled Implementation				
Energy Upgrade For DHW Systems				Scheduled Implementation				Scheduled Implementation													
Energy Upgrade For HVAC Systems				Scheduled Implementation				Scheduled Implementation													
Control Upgrade			Scheduled Implementation		Scheduled Implementation																
Lighting Upgrades	Scheduled Implementation																				
Operation Optimization					Scheduled Implementation																
 Scheduled Implementation  Cancelled Implementation												Q1 = Jan - Mar Q2 = Apr - Jun									
 Status = Completed  Status = Underway												Q3 = Jul - Sep Q4 = Oct - Dec									

17.5 ESTIMATED SAVINGS

At the end of the plan, **Service Yards, Central Stores, and Maintenance Facilities** are expected to save 17.55% over the base year of 2023

Figure 17-6: Energy Measure Annual Savings for Service Yards, Central Stores, and Maintenance Facilities



17.6 PROGRESS TO TARGETS

The City is targeting a 17.55% reduction in energy use in **Service Yards, Central Stores, and Maintenance Facilities** by 2028 over the base year, 2023. The reporting of energy consumption data and savings for **Service Yards, Central Stores, and Maintenance Facilities** will be based on utility meters and assembled annually. Since utility meters monitor energy consumption for the entire facility, the measurement boundary will encompass all parts of the facility. To determine the savings and fairly compare year-to-year energy consumption data, it is important to account for independent variables such as weather and occupancy and apply regression analysis to consumption data. Therefore, actual consumption data for each year starting 2024 will be adjusted to match the weather and occupancy of 2023. The figures below show the updated progress for each year against the set target.

18.0 PUMP STATIONS AND MISCELLANEOUS

For the purposes of this report, the City of Mississauga has 2 pumps stations and two miscellaneous sites. This group contributes to 1% of the total portfolio area and 0.18% of the total utility cost. The group has a total energy consumption of 247,870 e-kWh and 7,436 kg of CO₂.

Facility	# Facilities	Area m ²	Electricity		Natural Gas		Total Energy	Water		Total Costs	GHG Emissions
			kWh	\$	m ³	\$	e-kWh	m ³	\$	\$	kg
Pump Stations	2	557	30,127	\$4,519	0	\$0	30,127		\$0	\$4,519	904
Miscellaneous	2	3,988	217,743	\$32,661	0	\$0	217,743	630	\$0	\$34,236	6,532
Totals	4	4,545	247,870	\$37,180	0	\$0	247,870	630	\$1,575	\$38,755	7,436
Usage / Costs per m²:			54.5	\$8.18	0	\$0	54.5	0.14	\$0.35	\$8.53	1.64

APPENDIX 1.0: MEASURE TYPE INFORMATION

A1.1 PROJECTS

Project = Technological – operational & technological actions.

Examples: Lighting retrofit, new controls, efficient boiler, etc.

A1.1.1 BUILDING ENVELOPE

Building Envelope Sealing Minimizing heat loss by installing weather stripping on windows and doors, improving the building envelope. Saves natural gas for heating.

Window Coating Installing a film on building windows to: a) reduce heat loss in winter, cutting heating load; and b) reduce heat gain in summer, cutting air conditioning load. Saves both natural gas and electricity.

A1.1.2 CONTROLS

BAS Installation Installation of a Building Automation System (BAS). Can also be known as a Building Management System. A BAS is a network of controllers designed to monitor and control the mechanical (HVAC, ventilation, and dehumidification) and lighting systems of a building.

The BAS can be used to operate the equipment on a schedule, i.e. setting back, or turning off, during unoccupied periods.

BAS Upgrade An upgrade or modification to an existing Building Automation System. Usually entails new equipment, or improvements to the controls and/or control strategy.

CO2 Controls Controls used to monitor CO2 levels in a space and adjust fresh air ventilation according to needs. That reduces outside air brought into the building during unoccupied periods, reducing the need to heat/cool the air.

Ice Controls Controls used to monitor ice temperature and control the ice plant in an arena. Allows for adjustments to ice temperature depending on use type, and save energy during unoccupied periods by setting back temperatures.

Lighting Controls Installation of new controls to better operate lighting. Could include:

- Occupancy sensors to turn off lighting when a room is unoccupied.
- Scheduling control (through a BAS or other control system), enabling the lighting to be on or off as required.

Programmable Thermostats

Designed to adjust the temperature according to a series of programmed settings that take effect at different times. Programmable thermostats may also be called setback thermostats or clock thermostats.

Unit Heater Disconnect

Controls that sense when a large garage or bay door is left open and turns off the unit heaters in the immediate area.

Vending Miser

Special controls that turn off a vending machine, and turn it on when someone approaches by means of a sensor. The controls also cycle the compressors in the unit to ensure the contents stay cold.

A1.1.3 ENERGY DASHBOARD

Energy Dashboard

Computerized display showing a facility's energy (electricity and natural gas) and water usage, both current, and over a period of time.

The Energy Dashboard helps increase the energy awareness of facility operations staff and the public.

A1.1.4 EQUIPMENT UPGRADE

AHU Replacement

Replacing an Air Handling Unit (or rooftop, furnace or other general HVAC piece of equipment) with a higher efficiency unit.

Boiler Replacement

Replacing an existing boiler with a higher efficiency boiler. Normally performed when the existing equipment is at or near the end of its useful life.

Chiller Replacement

Replacing a chiller (used in air conditioning and ice plants) with a more efficient unit. Normally performed when the existing equipment is at or near the end of its useful life.

Desiccant Dehumidifier

Installation of a gas fired dehumidifier to replace an electric unit.

Free Cooling

Using outside air to provide cool a facility rather than an air conditioning unit. Generally done during shoulder seasons (i.e. spring and fall) when the temperatures are cool.

Heater Replacement

Replacing a heater with a more efficient unit.

Infrared Unit Heater

Replacing an electric or forced air unit heater with a more efficient infrared unit heater. An infrared unit heater heats the objects in the space, rather than the air, avoiding the loss of heat when doors are opened.

Usually installed in areas with large garage doors (fire stations, truck bays, etc.).

Insulation

Adding/fixing insulation on piping carrying hot fluids, on ductwork or equipment. The insulation helps reduce heat loss and saves on energy required for heating.

A1.1.5 HEAT RECOVERY

Waste Heat Recovery

A process that takes advantage of waste heat, i.e. the heat from exhaust air, the ice-making process in an arena or water drained from a pool. This waste heat can be used for preheating incoming air, space heating or pre-heating the hot water in the facility.

A1.1.6 IMPLEMENT NEW MEASURES

Energy Audit Measures

Implementation of measures determined by the Energy Audit

Re-commissioning Measures

Implementation of measures determined by Re-commissioning

A1.1.7 LIGHTING

LED Arena/Pool Lighting

Replacing the lighting, usually metal halide or mercury vapour, in an arena and/or pool with LED fixtures. The LED fixture would provide higher efficiency (lower energy use), better life (lower maintenance costs), and better control (dimming, on/off control).

LED Lighting Retrofit

Replacing the standard lighting with LED fixtures. The LED fixture would provide higher efficiency (lower energy use), better life (lower maintenance costs), and better control (dimming, on/off control).

LED Parking Lot

Replacing the standard lighting in a parking lot with LED fixtures. The LED fixture would provide higher efficiency (lower energy use), better life (lower maintenance costs), and better control (dimming, on/off control).

LED Street Lighting

Replacing the standard street lighting with LED fixtures. The LED fixture would provide higher efficiency (lower energy use), better life (lower maintenance costs), and better control (dimming during shoulder hours).

Lighting Retrofit

Modification to the lighting of a facility to save energy. Can involve:

- Replacing existing lighting with more efficient type lamps and fixture.
- Reducing lighting where areas are over lit.

- Installation of occupancy sensors and other controls to turn off lights when spaces are unoccupied.

A1.1.8 MAINTENANCE

Equipment Maintenance

Repairing existing equipment for energy efficiency. This does not include all maintenance performed on equipment.

Equipment Optimization

Adjustments of the operation or controls of equipment to make it operate more efficiently in general and energy efficiently.

A1.1.9 NEW TECHNOLOGY

New Technology

Installation of a new or recent technology or equipment meant to improve energy efficiency. Generally, unproven technology is installed at a single location for testing. Once proven, it is then installed in more facilities/locations.

A1.1.10 RENEWABLE ENERGY

Solar Photovoltaic

Installation of solar panels to generate electricity from the energy of the sun.

Solar Water Heating

A system that uses heat from the sun to pre-heat the domestic hot water of a building.

A1.1.11 VARIABLE SPEED DRIVE

Pool VSD

A Variable Speed Drive (VSD) that installed to control the speed of a pools filtration pump.

The filtration system, the system that removes contaminants from the pool water, is generally designed to operate at speeds based on full occupancy of the pool.

The VSD controls allows the pump motor to operate at lower speeds during periods of low to no occupancy (periods where the contaminant levels are low), savings large amounts of energy.

Variable Speed Drive

Installation of controls on electric motors which allows the motor speed to be reduced when the requirements on the motor or equipment are lower.

A slight reduction in the speed of an electric motor can have huge savings in electricity.

A1.1.12 WATER

Water Retrofit

A water retrofit generally involves installing more efficient washroom fixtures, including:

- low flow toilets;
- faucet aerators and low flow shower heads;

- faucet/tap sensors; and
- toilet/urinal flush sensors.

Reducing hot water use saves the natural gas (or electricity) required for heating the water.

A1.2 PROCESSES

Process = Organizational – building an energy managing culture.

Examples: Turning off equipment at night, implementing start up and shut down schedules, etc.

A1.2.1 CONTROLS

Control Optimization Optimizing the controls for equipment to provide more efficient operation. Includes:

- Improving equipment schedules to better match usage patterns and setback during periods of non-occupancy or non-use.
- Adjusting set points such as temperatures and outside air volumes, to save energy while maintaining building comfort.
- Adjusting the way equipment runs to improve its efficiency.

A1.3 PROGRAMS

Program = People – Awareness, habits, procedures & feedback.

Examples: Training staff in energy awareness, Employee Participation Program-Identification of Improvements.

A1.3.1 ENERGY AWARENESS

Energenius A strategy to help staff understand and accept the importance of energy conservation at all City facilities, and the initiatives of the Energy Management Team.

Includes a program that recognizes City employees for providing energy efficiency ideas.

EBEAR

Stands for Energy Benchmarking, Energy Awareness and Retro-commissioning (EBEAR). The City launched the program in January 2012 to improve energy performance in City-owned and operated facilities. The three elements:

1. Energy Benchmarking compares a facility’s EUI to other facilities of the same type, ranks a facility relative to the best in the portfolio of facilities, and sets targets for energy cost reduction.
2. Energy Awareness efforts help train and educate facility staff and users on how energy resources are being used in a facility, and how their actions can help bring down operating costs, reduce greenhouse gas emissions, and create a better environment.
3. Retro-commissioning identifies less-than-optimal performance in a facility’s existing equipment and control systems, and makes necessary upgrades or enhancements to save energy and cost.

Energy Champion

An Energy Champion is the “voice of energy efficiency” committed to improve the energy performance of City facilities by:

- Promoting energy conservation and building an energy-saving culture in our workplace.
- Being a point of contact for energy-related issues within a facility.
- Advocating for energy efficiency and conservation in regular staff or departmental meetings.
- Motivating staff to help maintain efficient operations within a facility.

Green Leaders

An ongoing program to provide information and incentives to staff to take sustainable actions and monitor environmental sustainability in the workplace. The ultimate goal is to create a green culture throughout the corporation.

Training

Providing training to City staff to help improve their energy awareness in key areas, such as BAS operation.

APPENDIX 2.0: DEFINITIONS

Below are definitions of some terms that may appear in this document.

AHU	Air Handling Unit. A device used to condition (heat or cool) and circulate air as part of a heating, ventilating, and air-conditioning (HVAC) system.
BAS	Building Automation System. Sometimes also referred to as a Building Management System (BMS). A BAS is a computer network of electronic devices designed to monitor and control a building's mechanical, security, fire and flood safety, lighting, HVAC and humidity control and ventilation systems.
CO₂	Carbon dioxide. A greenhouse gas that contributes to the greenhouse effect (See Greenhouse Gas)
Cubic Meter	Measurement of volume commonly used for natural gas. Can also be denoted as m³ 1 cubic meter of natural gas contains approximately 10.5 equivalent kilowatt hours of energy (1 m ³ = 10.5 e-kWh)
Conservation and Demand Management	The reduction or conservation of electricity and natural gas consumption and peak electricity demand.
Domestic Hot Water	Water used in washrooms, kitchens and showers. Does not include water used in pools or building heating.
Electricity Consumption	The electrical energy actually used. Measured in kilowatt hours. Example: ten 100-watt light bulbs used for 2 hours would consume 2,000 watts-hours, or 2 kilowatt-hours (10 x 100 watt x 2 hours = 2,000 watt-hours = 2 kWh)
Electricity Demand	The rate of using electricity. Measures in kilowatts. Example: ten 100-watt light bulbs consume electricity at a rate of 1,000 watts, or 1 kilowatt. The peak demand is the highest rate of electricity use during a given period of time.

Emission Factor	<p>Representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant.</p> <p>Usually expressed as the weight of pollutant divided by a unit weight, volume, distance, or duration of the activity emitting the pollutant (e.g., kilograms of CO₂ emitted per cubic meter of natural gas burned)</p>
Energy Efficiency Measure	<p>An action or work done to save on electricity, natural gas, oil, or other form of energy consumption, within City of Mississauga facilities.</p> <p>Each measure can be classified as a Project, a Process, or a Program (see definition for each).</p>
Energy Use Intensity	<p>Also referred to as EUI, a measurement that essentially expresses a building’s energy use as a function of its size or other characteristics.</p> <p>The measurement used in this plan for EUI is e-kWh/m²</p>
Equivalent kilowatt hour	<p>An equivalent kilowatt hour (e-kWh) is the conversion of an unit of energy to a common unit to better compare different types of energy sources.</p> <p>Example: Converting a cubic meter (see Cubic Meter) of natural gas to an equivalent kilowatt hour measure to compare to electricity usage in kilowatt hours.</p> <p>1 e-kWh is comparable to 1 kWh in energy terms</p>
EUI	See Energy Use Intensity
Facilities and Property Development	A section of the City’s Facility and Property Management division. The section is responsible for carrying out and implementing capital projects such as building construction, redevelopments, and life cycle replacement of equipment.
FIT	<p>Feed-In Tariff Program. Developed by the Province of Ontario to encourage and promote greater use of renewable energy sources including on-shore wind, waterpower, renewable biomass, biogas, landfill gas and solar photovoltaic (PV) for electricity generating projects in Ontario.</p> <p>See http://fit.powerauthority.on.ca/fit-program for more information.</p>
Fossil Fuel	A fuel (as coal, oil, or natural gas) formed in the earth from plant or animal remains.
GHG	See Greenhouse Gas

GHG Intensity	A measurement that essentially expresses a building's GHG emissions as a function of its size or other characteristics.
Green Energy Act	Formally Bill 150, the Green Energy and Green Economy Act, 2009 , introduced in the Ontario legislature on February 23, 2009. It aims to expand renewable energy production, encourage energy conservation and create green jobs.
Green Power	Energy produced from renewable and non-hazardous technologies. Common sources of green power include solar, wind, geothermal, biogas, and low-impact hydroelectric.
Greenhouse Gas	Any of the atmospheric gases that contribute to the greenhouse effect by absorbing infrared radiation produced by solar warming of the Earth's surface. They include carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (NO ₂), and water vapour.
HVAC	H eating V entilation and A ir C onditioning.
Kilowatt	Unit on measurement for the rate of power use (the power at any instance in time). Commonly used on electricity bills to show the electrical demand. 1 kilowatt = 1,000 watts 1 megawatt = 1,000 kilowatt Can also be denoted as kW
Kilowatt Hour	A measurement of power used (commonly electricity) over a period of time. 1 kilowatt hour = 1,000 watt hours 1 megawatt hour = 1,000 kilowatt hours 1 kilowatt hour = 1 watt x 1,000 hour OR 500 watts x 2 hour ² OR 2,000 watt x ½ hour Can also be denoted as kWh
kW	See Kilowatt .
kWh	See Kilowatt Hour .

LED	Light Emitting Diode. An electronic device that emits light when an electrical current is passed through it. Modern LED lights are highly efficient (more light for less power) and have a long lifespan.
LEED	Leadership in Energy and Environmental Design. An ecology-oriented building certification program. Concentrates its efforts on improving performance across five key areas of environmental and human health: energy efficiency, indoor environmental quality, materials selection, sustainable site development and water savings.
m³	See Cubic Meter .
Megawatt	1 Megawatt is equal to 1,000 kilowatts (see Kilowatt).
Megawatt Hour	1 Megawatt hour is equal to 1,000 kilowatt hours (see Kilowatt Hour).
MW	See Megawatt .
MWh	See Megawatt Hour .
Net-zero Carbon	Also called carbon neutral, refers to achieving net zero carbon emissions by balancing a measured amount of carbon released with an equivalent amount sequestered or offset.
Process	Organizational Energy Efficiency Measure, involving building an energy conservation culture. Examples: Turning off equipment at night, implementing start up and shut down schedules, etc.
Program	People Energy Efficiency Measure, involving awareness, habits, procedures and feedback. Examples: Training staff in energy awareness, Employee Participation Program-Identification of Improvements.
Project	Technological type Energy Efficiency Measure, involving operational and technological actions. Examples: Lighting retrofit, new controls, efficient boiler, etc.
Renewable Energy	Energy that comes from resources that are naturally replenished on a human timescale. Includes sunlight, wind, rain, tides, waves, and geothermal heat.