EDMONTON'S YEAR 2 BUILDING ENERGY BENCHMARKING REPORT.

Publication Date: April 2019

CHANGE BUILDINGS FOR CLIMATE

Edmonton

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The City of Edmonton is proud to have led by example in the second year of the program, with 55 City of Edmonton-owned and -operated properties participating.

The City of Edmonton, through the Community Energy Transition Strategy, which was unanimously approved by City Council in 2015, continues to show leadership in reducing carbon emissions by continuing to implement innovative initiatives like the Building Energy Benchmarking Program. This program is entering its third year and is a foundational step to creating a sustained change in the built environment and facilitating a low carbon future.

The City of Edmonton is proud to have led by example in the second year of the program, with 55 City of Edmonton-owned and -operated properties participating. The City commits to increasing this participation number every year while it continues to focus on sustainability in all stages of the building lifecycle.

Edmonton remains one of a handful of Canadian municipalities operating a building energy benchmarking program, a valuable step towards implementing effective energy management programs that can lead to both financial and greenhouse gas savings. Growing and showcasing industry expertise in high-performing, energy efficient buildings helps build and diversify Edmonton's economy while also helping achieve its important climate goals. This program highlights the excellent work that has already being done and outlines the path ahead for improvement in the future.

The benchmarking program includes success stories like the 9925 building (managed by Triovest Realty Advisors). This building achieved nearly 20% year-over-year reduction in energy use intensity resulting from a series of significant energy efficiency projects. Their improvements included an extensive lighting retrofit to low-voltage LED, upgrades to a high-efficiency boiler system, and a major overhaul of the chiller system. Energy Benchmarking provides buildings the information and leverage needed to make these upgrades which will benefit their bottom line as well as their carbon emissions.

To all those who participated in the second year of the benchmarking program, your leadership sets an example for others, showing a commitment to transparency, and demonstrating a willingness to take action. Thank you for your involvement and we hope you continue to support Edmonton's energy transition initiatives as we prepare for a low carbon future.

Don Iveson
Mayor

As the voice of commercial real estate in Edmonton for more than 50 years, BOMA members are committed to sustainable building operations.

With more than 7,000 buildings obtaining a certification or recertification since its inception in 2005, BOMA BEST is Canada's largest environmental assessment and certification program for existing buildings. It is a unique, voluntary program designed by industry for industry; it provides owners and managers with a consistent framework for assessing the environmental performance and management of existing buildings of all sizes.

BOMA BEST Sustainable Buildings certification recognizes excellence in energy and environmental management and performance in commercial real estate. The Program is managed by the Building Owners and Managers Association of Canada (BOMA Canada) and delivered by the eleven Local BOMA Associations throughout Canada. BOMA BEST enables buildings to demonstrate their commitment to sustainability, providing them a roadmap of best practices for improved performance resulting in as much as a 30% reduction in the building's energy consumption.

As the voice of commercial real estate in Edmonton for more than 50 years, BOMA members are committed to sustainable building operations and we believe that Edmonton's Building Energy Benchmarking Program is valuable for building owners/operators. Benchmarking enables improved energy efficiency for buildings as it provides building owners and managers with a measure of their building's performance and allows them to see where they stand compared to similar buildings. Evidence of the financial benefits of energy efficient buildings has grown substantially, with direct savings through reduced energy bills and operational costs as well as indirect benefits such as increased market value for leasing and sales.

Edmonton's Building Energy Benchmarking program and BOMA BEST are complementary initiatives with the City planning to begin BOMA certification of buildings in 2019. Our collaboration with the City of Edmonton in their delivery is mutually beneficial and ensures that Edmontonians continue to benefit from greener, more efficient buildings. As such, we encourage all buildings that undergo benchmarking to take the next step and pursue BOMA BEST certification.

We appreciate the City of Edmonton's commitment to green buildings and we look forward to continuing our joint efforts to make environmentally friendly buildings the new market norm.

Sincerely,

Percy Woods
President and CEO, BOMA Edmonton

PROGRAM OVERVIEW

BUILDING ENERGY BENCHMARKING IN EDMONTON YEAR 2

In 2017, the City of Edmonton launched a voluntary building energy benchmarking program to help lay the foundation for Edmonton's transition to a low-carbon, sustainable energy future by making building energy performance information accessible to interested stakeholders. In the second year of the program 184 buildings across Edmonton participated. As a part of Edmonton's Community Energy Transition Strategy, the program compiled and compared annual whole building energy consumption across Edmonton's large building stock and will use this information to benchmark building energy performance, facilitate energy efficiency improvements and greenhouse gas (GHG) reductions.

Building Energy Benchmarking is the process of comparing a building's energy and emissions performance to similar buildings, and to itself over time.

WHY WAS THE PROGRAM DEVELOPED?

The City of Edmonton's Building Energy Benchmarking Program was developed to complement the Federal Government's policy objective for mandatory large building reporting requirements as outlined in the Pan Canadian Framework on Clean Growth and Climate Change. Similar large commercial building energy reporting programs are becoming commonplace in North America, with programs in 47 jurisdictions in the US. These programs are designed to encourage broad market transformation by providing transparency in building energy performance, with the intent of valuing energy efficiency in the building sector. Benchmarking provides information on a building's energy use patterns relative to similar building types which can lead to action being taken to reduce energy consumption and GHG emissions.

Beyond simply encouraging energy reductions in participating buildings, the program generates valuable data on Edmonton's building energy performance and energy saving opportunities. It will also be a chance to benchmark a broad range of buildings, spreading successful tracking and management practices beyond just the efficiency champions, to multi-unit residential buildings, retail facilities, light industrial buildings and other segments that are less engaged in energy benchmarking. These data streams and practices will provide value beyond the initial program, offering the City data by which to design effective programs to support the Community Energy Transition Strategy goals.

HOW DOES THE PARTICIPANT BENEFIT?

In addition to generating valuable data for governments and markets, the program also offers a number of direct benefits to participants. The Benchmarking Support Services Help Desk provides one-on-one support to ENERGY STAR Portfolio Manager users (the data reporting tool for the program), to help ensure that participant properties are set up with accurate property characteristics and energy utility information. Participants will receive benchmarking results, comparing their building to similar program participants or other relevant performance benchmarks. Participants are also recognized publicly for their involvement in the program, and receive targeted communications for other energy efficiency programs.

WHAT KIND OF DISCLOSURE IS REQUIRED?

While transparency is an essential part of building energy benchmarking programs , disclosure at the building level is optional for all Edmonton participants and only anonymized data is published in this report, unless the building owner has consented to detailed disclosure. As a result, there are two types of participants referenced throughout this report – those whose performance will remain anonymous (only presented in aggregate) and those who consented to building level disclosure.

Energy use intensity (EUI) is the energy use for the whole building for one year divided by building area. It is the most commonly used metric for benchmarking building energy performance.

HOW IS BENCHMARKING DONE?

Benchmarking building energy consumption starts with the "energy usage intensity" (EUI) metric, which is the energy use for the whole building for one year divided by building area. Many factors are taken into consideration when undergoing energy benchmarking to ensure an accurate comparison, however these are not considered when looking strictly at energy usage intensity (EUI). That being said, EUI still remains the best tool to use as a benchmark and will only strengthen as building databases grow from building energy reporting and disclosure programs.

Energy use and GHG intensities are used to compare the energy performance of different sized properties, and express energy consumption and emissions on a per unit of gross floor area basis (gigajoules per square meter or square foot). Energy use intensity (EUI) is the most commonly used metric for benchmarking building energy performance. EUI data can be normalized or adjusted to remove weather effects and other building variables (e.g. operating hours, number of workers, etc.) to account for any marked differences between buildings. With increased sophistication, more energy benchmarking metrics can be tracked, including metrics for processes, systems, etc. Some sectors may use additional metrics such as the number of students in a school or the number of beds in a hospital.[1]

Portfolio Manager also provides ENERGY STAR Scores for several building types in Canada. The ENERGY STAR Score is a metric for comparing a property to other similar properties, normalized for climate and operational characteristics. Scores are given on a 1-100 scale, with 1 being the lowest performer in a peer comparison group, 50 being the median performer, and a score of 100 being the best-in-class performer. In Canada, scores are available for Offices, K-12 Schools, Hospitals, Medical Offices, Senior Care Communities, Supermarkets, and Arenas.

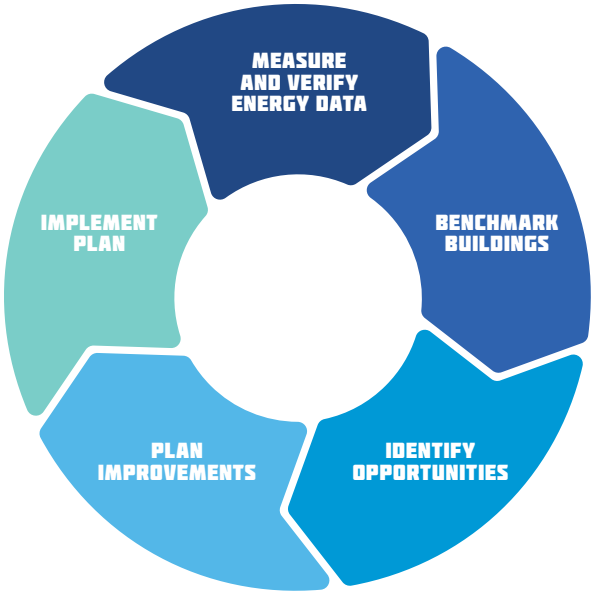
1 *Natural Resources Canada. Improve Your Buildings Energy Performance: Energy Benchmarking Primer*

PURPOSE OF BENCHMARKING

WHY BENCHMARK?

Energy benchmarking is a powerful tool that should be part of an organization's energy management best practices. It can identify opportunities to save both energy and money. How effective energy benchmarking is within an organization depends on how well individuals within the organization can act on the information and how the information derived from benchmarking acts as a catalyst to or feeds existing mechanisms and processes. Energy benchmarking is an organization's first step on the road to energy savings and greater overall sustainability.[2]

FIGURE 01: AN ENERGY MANAGEMENT PROCESS THAT INCLUDES BENCHMARKING



Benchmarking can identify opportunities to save both energy and money.

2 *Natural Resources Canada. Improve Your Buildings Energy Performance: Energy Benchmarking Primer*

WHAT ARE THE BENEFITS OF ENERGY BENCHMARKING?

ECONOMIC BENEFITS

There is a well-established body of evidence rooted in extensive research into the economic value of energy efficiency improvements and energy use monitoring.[3] [4]

ENERGY BILL SAVINGS

The most direct and obvious benefit to buildings that engage in benchmarking flows from the savings on energy bills that is achieved after implementing energy efficiency measures. The U.S. Environmental Protection Agency released a report which showed that organizations that benchmarked their energy consistently saved energy costs annually over three years.[5]

RENTAL PREMIUMS

Investments in energy efficiency have been shown to lead to an increase in rental fees and demonstrate that energy efficient buildings attract higher rental fees than less efficient buildings. Studies indicate that energy-efficient buildings frequently rent for higher amounts per square foot.[6] Occupants and tenants also report a higher degree of satisfaction and comfort in energy-efficient buildings.

HIGHER BUILDING VALUE AND SALES PRICES

Evidence is also growing that the competitive advantages of green buildings translate into higher overall value in the marketplace. Energy efficiency upgrades have also been shown to increase the selling price of a building.[7] [8]

ENERGY EFFICIENCY + CLIMATE BENEFITS

Building energy benchmarking enables building owners, property managers, tenants, and other stakeholders to understand the energy performance and greenhouse gas usage of buildings and helps with incorporating energy performance into decision making. In a survey conducted by Ernst and Young and GreenBiz (including interviews with chief executive officers), 66 percent of the respondents reported an increase in interest from shareholders and investors in sustainability and energy issues with a majority of inquiries focusing on company efforts to increase energy efficiency measures and adopt quantitative measure to do so.[9] Competitive insights gained from benchmarking help prioritize efficiency upgrade opportunities across the building stock and lead to energy savings over time.

MARKET TRANSFORMATION

Over time, the greatest value of building benchmarking is its potential to provide information to the real estate market that can form the basis of a robust market for building efficiency that will drive deeper energy savings. Research has consistently found that limited access to information on building energy performance is one of the largest barriers to transformation of the market to support more energy efficient buildings.

3 *http://cleanenergycanada.org/wp-content/uploads/2018/04/TechnicalReport_EnergyEfficiency_20180403_FINAL.pdf*

4 *Natural Resources Canada. Improve Your Buildings Energy Performance: Energy Benchmarking Primer*

5 *United States Environmental Protection Agency (2012) Portfolio Manager Data Trends series: Benchmarking and Energy Savings, [Online], Available: www.energystar.gov/buildings/tools-and-resources/datatrends-benchmarking-and-energysavings*

6 *Nils Kok, The Economics of Green Building (2011).*

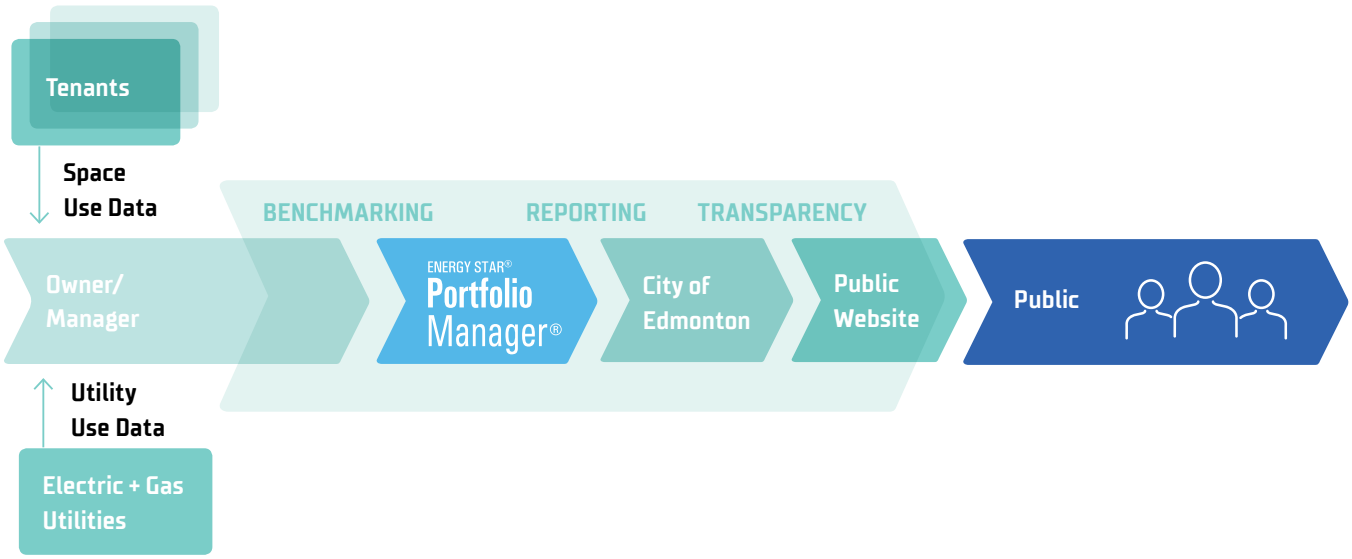
7 *Nils Kok, The Economics of Green Building (2011).*

8 *Natural Resources Canada. Improve Your Buildings Energy Performance: Energy Benchmarking Primer*

9 *Ernst and Young & GreenBiz Group (2012), Six growing trends in corporate sustainability: An Ernst & Young survey in cooperation with GreenBiz Group, [Online], Available: www.greenbiz.com/research/report/2012/03/01/six-growing-trends-corporate-sustainability*

PROCESS OUTLINE

FIGURE 02: BENCHMARKING WITH PORTFOLIO MANAGER PROCESS



Recent studies indicate that energy-efficient buildings often command higher market rents than less efficient buildings.

YEAR 1 HIGHLIGHTS

Year 1 of the Building Energy Benchmarking Program had a target of 100 buildings – it attracted 83 participant properties (representing 99 buildings), representing over 20 different primary property uses. These property uses were grouped into six unique categories: Office, Retail, Multi-Unit Residential, Education, Recreation, and Other. Properties were submitted by over 20 unique organizations.

The Office category had 31 participants, and provided a robust peer group for comparing ENERGY STAR Scores. The multi-unit residential building (MURB) category had 5 only participants in Year 1, but was identified as a key target sector for Year 2 recruitment. Other segments were too sparsely populated to permit peer group comparison, so performance comparisons were made against available national and provincial medians.

Year 1 attracted 83 participant properties representing over 20 different primary property uses.

An event was held in Spring 2018 to recognize key contributors to Year 1 of the program and to present awards to recipients in the following categories:

PERFORMANCE AWARDS

- **Commercial and Institutional Buildings with ENERGY STAR Scores ≥ 90**
- **Best Energy Performance for Multi-Unit Residential Building**
- **Best Energy Performance for a Not-for-Profit Building**

PARTICIPATION AWARDS

- **Organization submitting the greatest number of buildings**
- **Organization submitting the most gross floor area**

LEADERSHIP AWARDS

- **Energy Transparency Awards –** recognizing organizations that consented to building-level disclosure of their properties' energy performance
- **Program Advisor Awards** – recognizing organizations that contributed to the City's Building Energy Benchmarking Industry Advisory Group

The City's recruitment effort in Year 2 built upon the success of Year 1, increasing participation by more than 90% and resulting in an improved dataset that provides greater transparency into the energy performance of Edmonton's commercial and institutional energy sectors.

PURSUE BOMA BEST

In support of the City's Energy Transition strategy and the Sustainable Building Policy (City Council Policy C532)* and guided by the Year 1 benchmarking results, **the City identified five buildings that will pursue BOMA BEST Certification in 2019:**

- **Century Place**
- **Chancery Hall**
- **Kinsmen Sports Centre**
- **Terwillegar Community Recreation Centre**
- **Clareview Community Recreation Centre**

BOMA BEST®

* *Adopted in 2017, the Sustainable Building Policy directs The City of Edmonton to lead-by-example in establishing, implementing and maintaining sustainable building practices for the buildings it owns, leases and funds, over the course of their entire lifecycle. The policy stipulates that The City will demonstrate excellence in sustainable practices in existing City-Owned Buildings through the establishment of a BOMA BEST certification program.*

Learn more at energybenchmarking

ACKNOWLEDGEMENTS

COLLABORATORS

The City of Edmonton would like to thank the many businesses and organizations who have contributed to the design and implementation of Edmonton's Building Energy Benchmarking Program. It is important to acknowledge the time and effort many individuals have dedicated to ensuring an effective and relevant local program. Some collaborators provided their expert advice and others support access to high-quality data—all of which was integral to our success.

Specifically, we would like to thank:

- ATCO
- BOMA Edmonton/BOMA Canada
- Canada Green Building Council
- City of Edmonton's Energy Transition Advisory Committee
- Edmonton's Building Energy Benchmarking Industry Advisory Group
- EPCOR
- Municipal Climate Change Action Centre
- Natural Resources Canada
- NAIOP
- RealPac

PARTICIPANT OVERVIEW

Year 2 of the City of Edmonton's Building Energy Benchmarking Program attracted a wide range of participants. Overall, 159 properties representing 184 individual buildings were submitted to the program by 30 different organizations, falling just shy of the 200-building target for Year 2. The data included both single-building and multi-building (i.e. campus) properties, covering 2,763,000 m^2 gross floor area, equivalent to 9.5% of the floor area identified by the City of Edmonton's Building Stock Analysis.[10]

Participation increased significantly between Year 1 and Year 2, with an 86% increase in participating buildings and a 37% increase in total floor area. Of particular note is that over 80% of all Year 1 participants returned in Year 2. Analysis of year-over-year energy performance was possible for 69 properties, as discussed in the following sections.

10 City of Edmonton conducted a building stock analysis as part of the program development process that identified 4,435 buildings over 20,000 SQF covering a total 29,101,000 m^2

FIGURE 03: LOCATION OF PARTICIPATING PROPERTIES

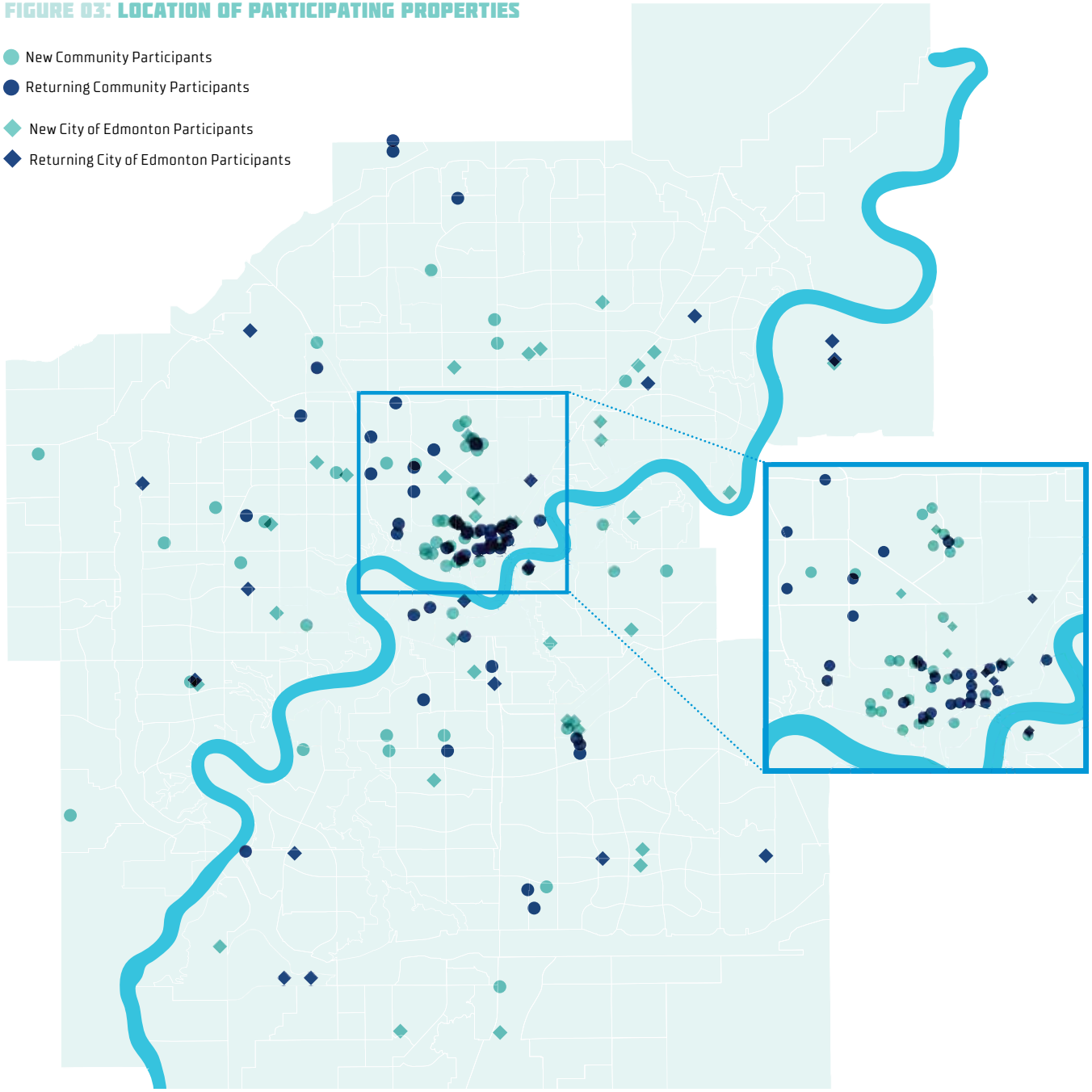


FIGURE 04: PARTICIPATION SUMMARY – YEAR 1 VS. YEAR 2

Properties	83	159	92%
Buildings	99	184	86%
Organizations	21	30	43%
Floor Area (m²)	2,017,000	2,763,000	37%

BUILDING CATEGORIES

ENERGY STAR Portfolio Manager offers users over 80 different Property Use Types to choose from when describing the activities in their building. If a single property use type accounts for more than 50% of the building's Gross Floor Area (GFA), then that is considered the Primary Property Type and is used to form the peer comparison group of similar buildings. Participants submitted properties representing over 30 different primary property uses, which were grouped into nine unique categories:

- **Offices** Offices and Financial Offices
- **Multi-Unit Residential Buildings (MURBs)** Apartments, condominiums, and long-term residence buildings
- **Education** K-12 Schools, Adult Education, and other training facilities
- **Multiplexes** Buildings that are predominantly Fitness Centers, Health Clubs and Gyms
- **Arenas** Buildings that are predominantly Ice or Curling Rinks
- **Retail** Enclosed malls and strip malls
- **Warehouses** Non-Refrigerated Warehouses and Distribution Centres
- **Libraries**
- **Other** Various cultural, light industrial, and municipal/ provincial government buildings that do not fit into any of the other categories

As shown in the figure below, Offices are the dominant property type among program participants, representing roughly a quarter of all properties and a third of all reported floor area. Education buildings and Multi-Unit Residential Buildings (MURBs) each make up roughly 10% of properties and floor area.

FIGURE 05: **PARTICIPATING BUILDING GROSS FLOOR AREA BY PROPERTY CATEGORY**

Office
45 properties
985,000 m²

MURB
20 properties
259,000 m²

Education
19 properties
340,000 m²

Multiplex
14 properties
183,000 m²

Arena
8 properties
28,000 m²

Warehouse
6 properties
21,000 m²

Library
4 properties
15,000 m²

Retail
2 properties
110,000 m²

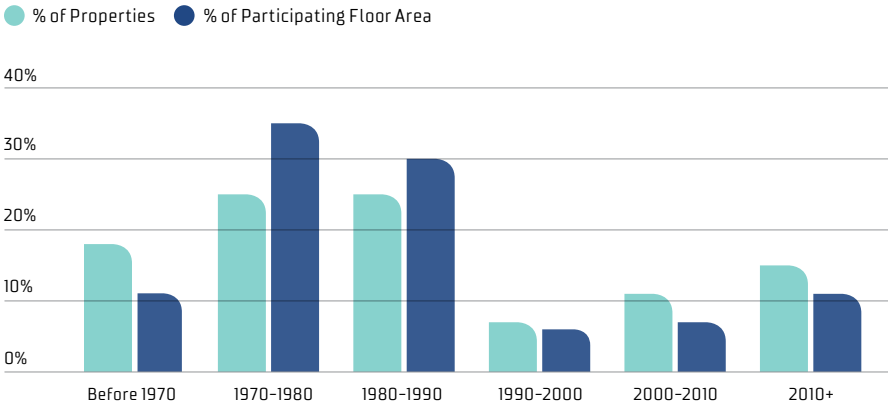
Other
41 properties
823,000 m²

All participants:
159 total properties, representing 184 buildings and 2,763,000 m² of floor area

Examining the reported year of construction indicates that the majority of participating floor area was constructed before 1990, suggesting that much of the commercial floor area in Edmonton is approaching 30 years old and possibly in need of major renovation, an excellent opportunity to undertake energy efficiency retrofits.

67% of participating properties were constructed before 1990

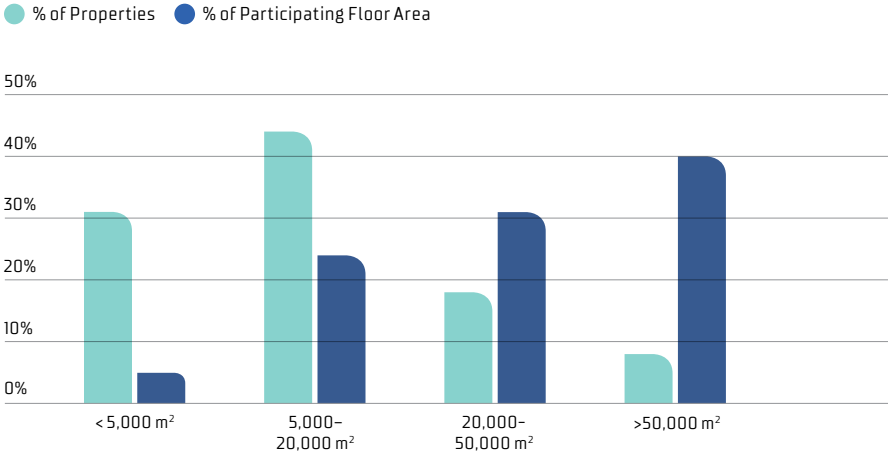
FIGURE 06: PROGRAM PROPERTIES AND GROSS FLOOR AREA BY VINTAGE



The participant data was also examined based on property size. Most notably, the largest commercial properties (larger than 50,000 m^2) made up 8% of all reported properties, but 40% of all reported floor area. Note that the number of properties submitted increased by 92% between Year 1 and Year 2, but the submitted floor area increased by only 37%. This indicates that the average participating property is smaller in Year 2 than in Year 1.

Over 80% of all Year 1 participants returned in Year 2

FIGURE 07: PARTICIPATING BUILDINGS GROSS FLOOR AREA BY SIZE CATEGORY (m^2)



The age and size data were also examined by property category. The data indicate a fairly consistent average age across category, with Arenas notably older on average. Retail buildings, offices, and education buildings are notably larger on average, while arenas and libraries are typically smaller.

Note that the statistics here are intended to describe the Year 2 program population only and are not intended to represent statistically significant samples of the broader commercial real estate market within the city of Edmonton. Some property types have only a small number of participants, which may skew age and size trends for that property type. Further, the vintage data collected represents when each building was first constructed – it is likely that many of these properties have undergone significant renovations since initial construction, and thus the vintage data may not show strong correlation with energy performance.

Returning participants decreased their total energy use by 4.3% between Year 1 and 2.

FIGURE 08: AVERAGE YEAR BUILT BY PROPERTY TYPE

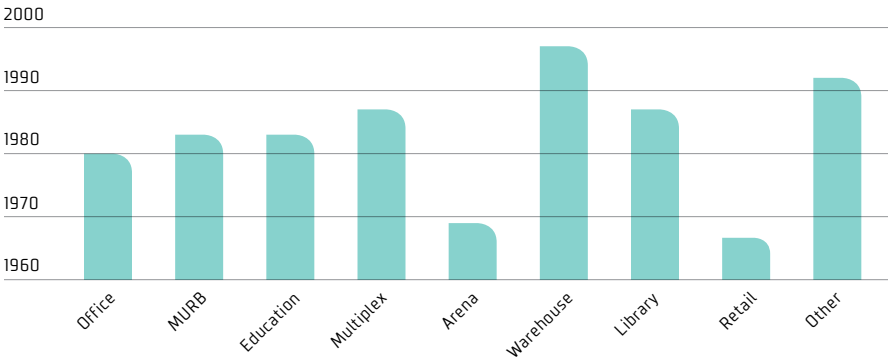
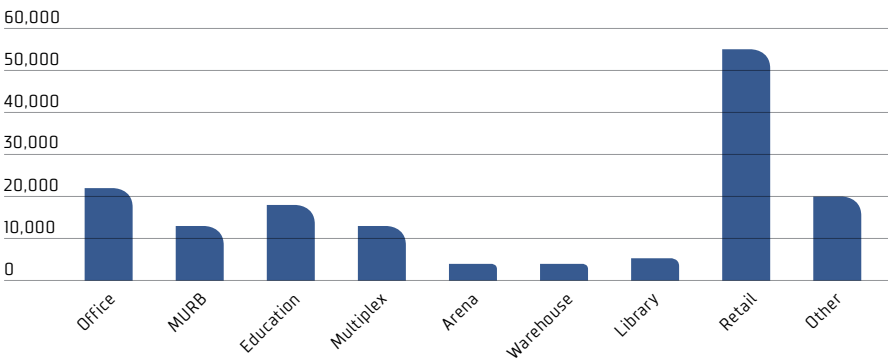


FIGURE 09: AVERAGE SIZE BY PROPERTY TYPE (m^2)



CITY OF EDMONTON

The City of Edmonton continues to "walk the talk" in Year 2 of the program, submitting 55 properties (representing 60 buildings) for calendar year 2017. These properties represent a typical cross-section of municipal properties, ranging from offices, to community recreation centres, arenas and waste management facilities. The complete list of participating facilities belonging to the City of Edmonton is shown below.

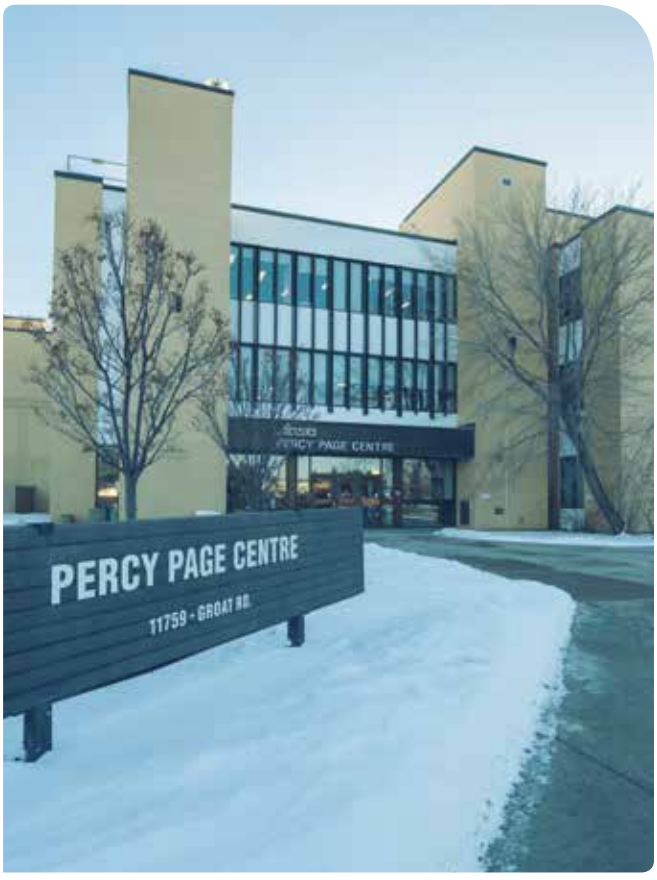
FIGURE 10: PARTICIPATING PROPERTIES — CITY OF EDMONTON

- Century Place
- Chancery Hall
- City Hall
- Clareview Community Recreation Centre
- The Meadows Community Recreation Centre
- Saint Francis Xavier Sports Centre
- Terwillegar Community Recreation Centre
- Animal Care and Control Centre
- Muttart Conservatory
- Ambleside ECO Station
- Centennial Transit Vehicle Repair/ Storage Garage
- Kennedale Eco Station
- Waste Services Equipment Storage & Maintenance Facility
- Waste Services Integrated Processing & Transfer Facility
- Callingwood Arenas
- Engineering Services Building TS Materials Test Lab
- Southwest Transit Yard Equipment Storage Garage
- Kinsmen Sports Centre
- Mill Woods Recreation Centre
- Peter Hemingway Fitness and Leisure Center
- Central Lions Seniors Recreation Centre
- Glengarry Arena
- Donnan Arena
- ACT Complex
- Davies Site Richard Paterson Garage
- DL MacDonald LRT Garage
- Londonderry Leisure Centre and Arena
- O'Leary Pool
- Waste Management Research & Development
- Confederation Arena & Leisure Centre
- Commonwealth Recreation Centre + Commonwealth Stadium + Clarke Stadium
- Grand Trunk Leisure Centre and Arena
- Kenilworth Arena
- Fire Station No. 1
- Fire Station No. 28 (Heritage Valley)
- Corporate Training School – Fire Rescue Services
- Northeast Traffic Field Operations
- Davies Site Fleet Services Building
- Tipton Arena
- George S. Hughes Arena
- Russ Barnes Arena
- Ellerslie Fleet Services
- Ferrier Transit Garage
- Westwood Transit Garage
- Mill Woods Library
- Highlands Library
- Jasper Place Library
- Lois Hole Library
- Police Station – Southwest-Windermere
- Police Station – Downtown Division
- Police Station – Southeast
- Northwest TS Yd Equipment Shop
- Emergency Response Centre Station No 42
- Prince of Wales Armouries
- Hardisty Pool

Note that the City of Edmonton conducted a detailed review of the floor areas submitted for their properties in Year 1 of the BEBP, and have revised several buildings as part of their Year 2 submission. For this reason, the EUIs listed for City properties may be unusually higher or lower than the EUIs reported in Year 1.

The province's office buildings scored well

3 of 5 submitted properties have an ENERGY STAR Score above 75.



GOVERNMENT OF ALBERTA

The Government of Alberta was again a key participant in Year 2 of the program, submitting 20 buildings to Edmonton's program. The province's office buildings scored well – 3 of the 5 submitted properties have an ENERGY STAR Score above 75, and the Winnifred Stewart School was the most energy efficient Education building in the Year 2 sample!

FIGURE II: PARTICIPATING PROPERTIES – GOVERNMENT OF ALBERTA

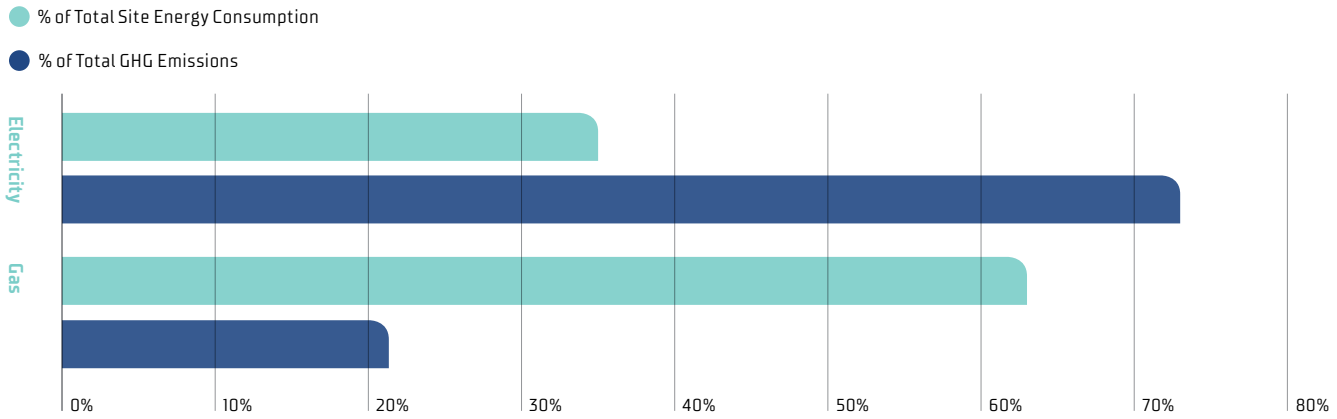
John E. Brownlee Building
Alberta School For The Deaf
Northern Alberta Jubilee Auditorium
Law Courts Edmonton
Bonaventure Workshop
Intoxication Recovery Centre
Infrastructure Building (Shops)
Single Mens Hostel Edmonton
Old St. Stephen's College
Queen's Printer
Central Vehicle Service Garage
Percy Page Centre
Solicitor General Staff College
Winnifred Stewart School
Edmonton Remand Centre
Yellowhead Youth Centre
Land Titles Building Edmonton
Infrastructure Warehouse No. 3
Alberta Research Council Millwoods
Young Offender Centre Edmonton

ENERGY PERFORMANCE RESULTS

In total, Year 2 participant buildings consumed 418,000,000 kWh of electricity, 2,704,000 GJ of natural gas, as well as small volumes of district steam and chilled water in calendar year 2017. The total energy consumed by program participants represents 13.8% of all the energy consumed by commercial and institutional buildings within the City of Edmonton in 2017.[11]

The energy use from program participants is associated with 540,000 tonnes of CO_2e[12] greenhouse gas emissions, equivalent to 15.6% of all the emissions from Commercial and Institutional buildings within the City of Edmonton in 2017.[13] Expressed differently, the emissions from participant buildings are equivalent to the annual GHG emissions of roughly 117,000 cars.[14] Note that emissions are calculated using the Alberta-specific emissions factors within Portfolio Manager that are updated annually by Natural Resources Canada.

FIGURE 12: COMPARISON OF GAS + ELECTRICITY CONSUMPTION + EMISSIONS



11 *City of Edmonton – 2017 Community Greenhouse Gas (GHG) Emissions Inventory Report*

12 *Carbon dioxide equivalent is a method of comparing the Global Warming Potential (GWP) of the different greenhouse gases (e.g. carbon dioxide, ammonia and nitrous oxide) released during combustion of fossil fuels.*

13 *City of Edmonton – 2017 Community Greenhouse Gas (GHG) Emissions Inventory Report*

14 *Based on an assumed 4,600 kg CO2e per car, per year (http://www.nrcan.gc.ca/energy/efficiency/transportation/cars-light-trucks/buying/16770)*

ENERGY USE AND GHG EMISSIONS INTENSITY (ALL BUILDINGS)

The figures below show the frequency distribution of source energy use intensity for all 159 properties in the sample. The distribution of energy use intensity is very similar to the emissions intensity intensity distribution as most participant buildings have similar fuel shares (roughly 40/60 split between electricity and gas), and because the carbon intensity of electricity generated in Alberta is similar to the carbon intensity of natural gas combusted on-site. In provinces where electricity is much less carbon-intensive, the comparison of EUI and GHG intensity distributions would be noticeably different.

The median source EUI for the sample is 1.86 GJ/m², and the median GHG intensity is 170 kg-CO2e/m².

FIGURE 13: YEAR 2 DISTRIBUTION OF BUILDING SOURCE EUI – ALL BUILDINGS [GJ/m²]

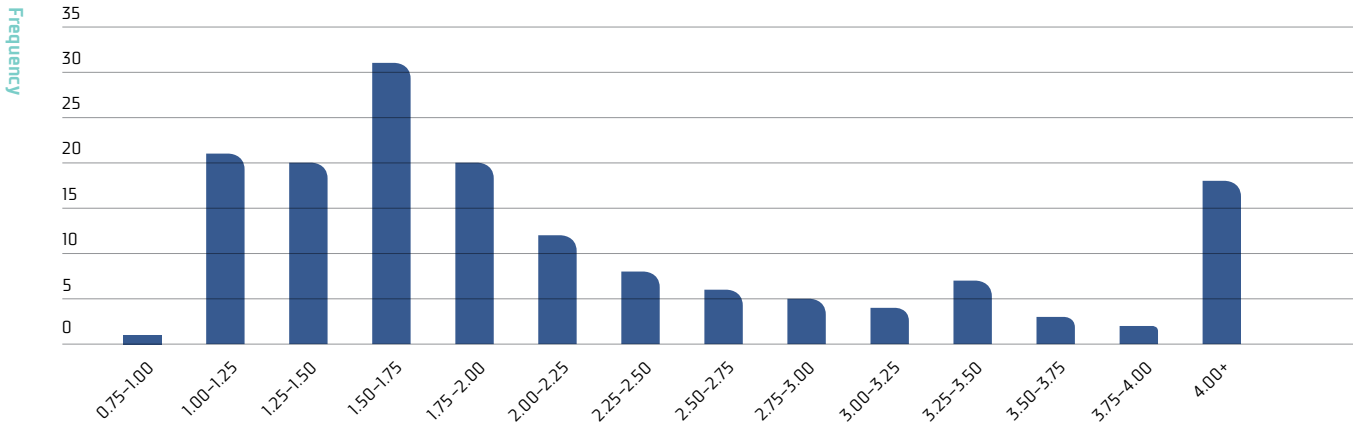
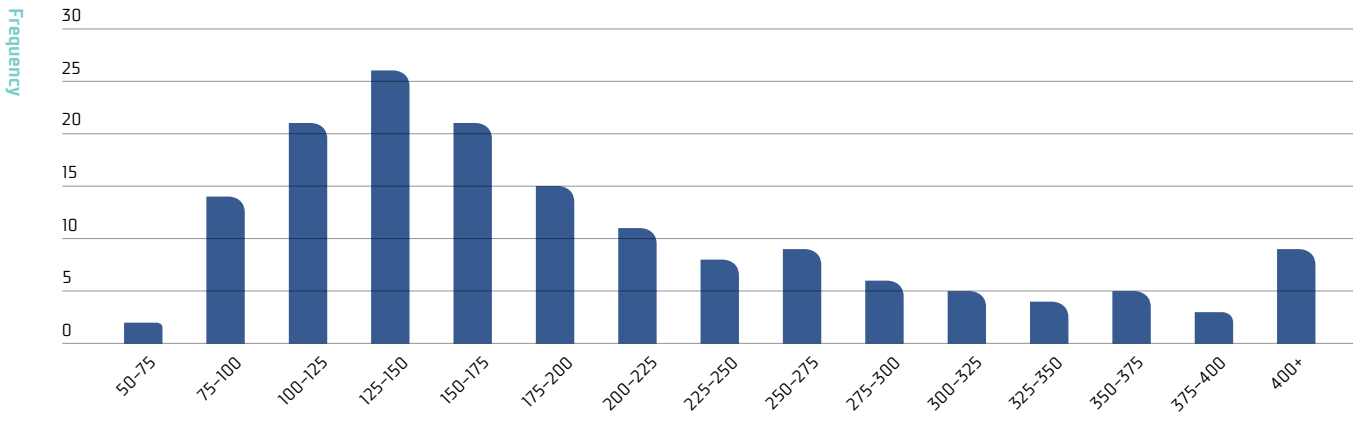


FIGURE 14: YEAR 2 DISTRIBUTION OF GHG EMISSIONS INTENSITY – ALL BUILDINGS [kg CO2e/m²]



ENERGY PERFORMANCE BY SIZE, VINTAGE AND CATEGORY

The Year 2 participant data were analyzed for energy performance trends dependent on building size, vintage, and category. In Year 1, there was a general trend of higher EUIs for newer buildings. However, as shown in Figure 15, this trend is no longer visible in the Year 2 data – the 1980–1990 vintage had the lowest median EUI, while the 1990–2000 vintage had the highest median EUI. This finding suggests that building vintage alone is not a reliable predictor of energy performance, though the sample size in both years is too small to draw such a conclusion for the general building population.

As shown at right, there is no clear trend relating energy performance to building size either. In Year 1, the trend was towards higher EUIs in larger buildings – in Year 2 that trend is no longer visible in the data. In Year 2, the highest median EUI is found in the medium-to-large building category (20,000 – 50,000 m^2) and the lowest median EUI is found in the very large building category (> 50,000 m^2). This finding suggests that building size alone is not a reliable predictor of energy performance, though again the sample size in both years is too small to draw such a conclusion for Edmonton's broader building population.

FIGURE 15: ENERGY USE INTENSITY BY AGE

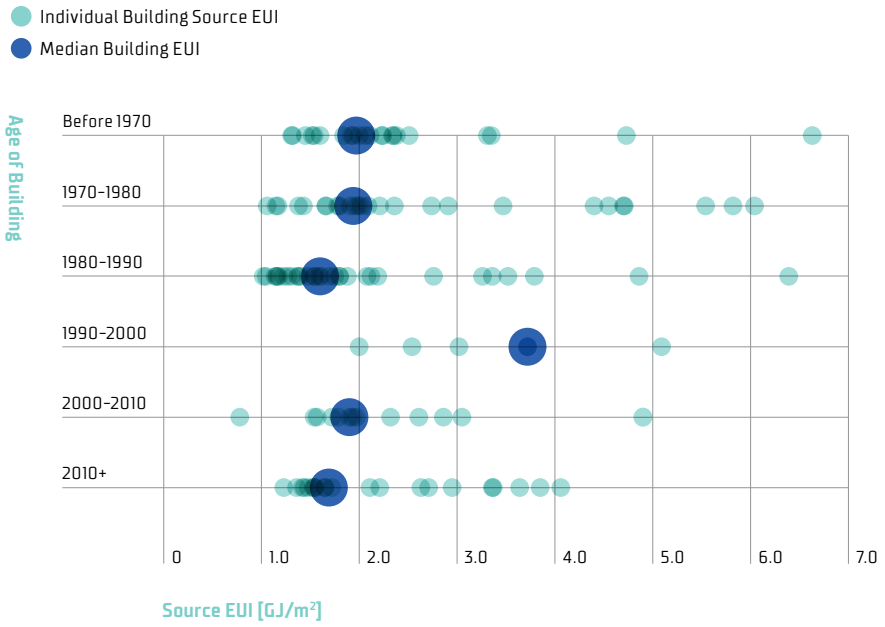
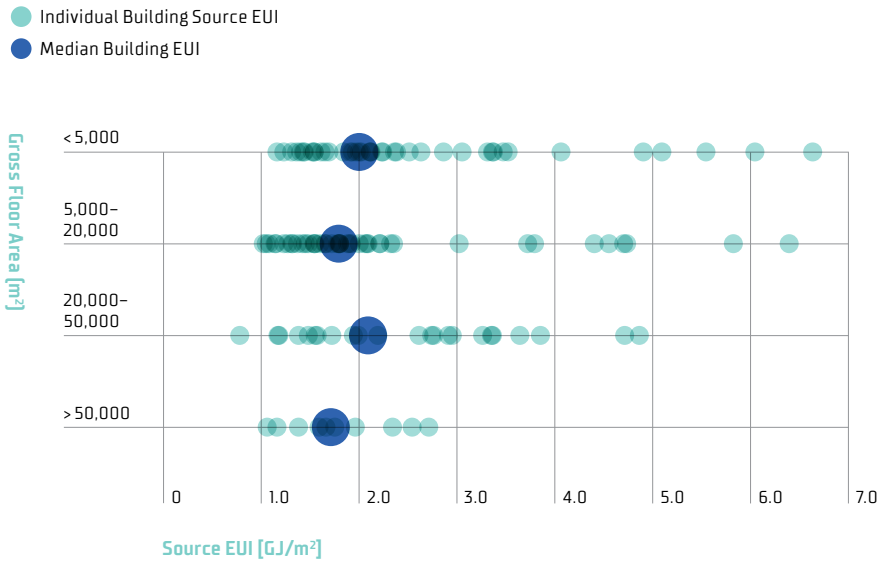


FIGURE 16: ENERGY USE INTENSITY BY SIZE

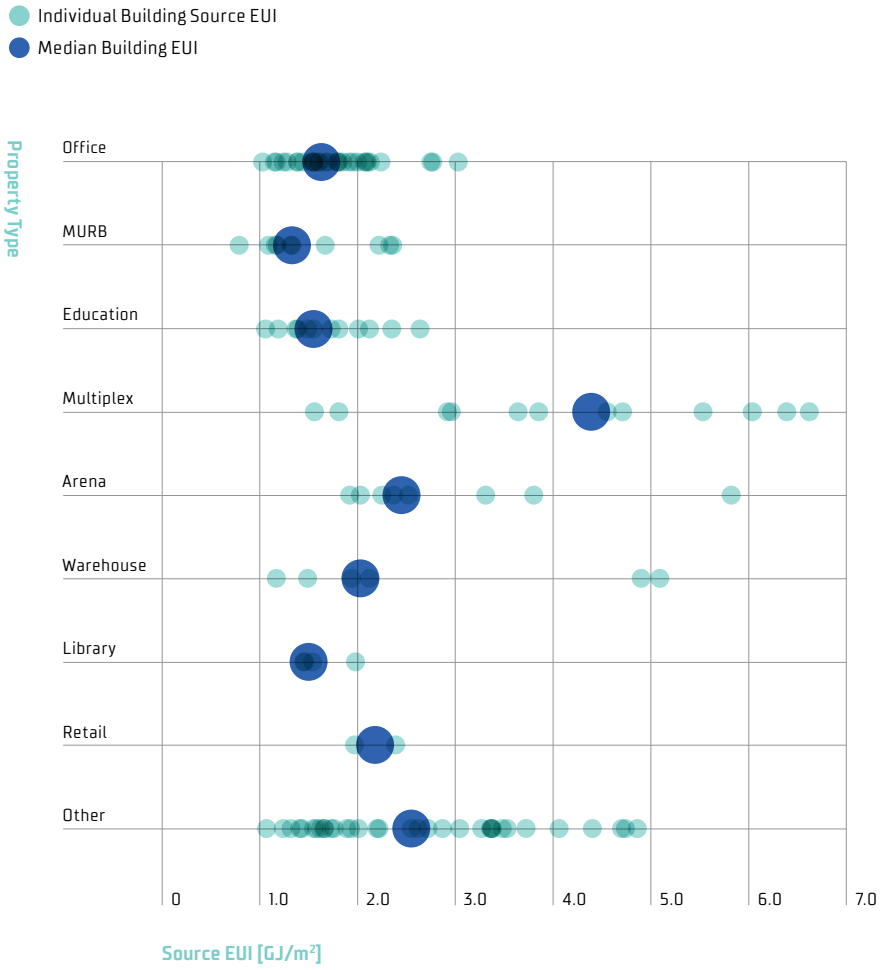


The plot to the right shows the average EUI distribution for the nine property type categories identified for Year 2. The results are consistent with the Year 1 findings – MURBs have the lowest median EUIs, and Recreation properties (inc. Arenas and Multiplexes[15]) have the highest median EUIs. This finding reinforces the importance of benchmarking against a peer comparison group of buildings with similar internal functions.

The Year 2 of the Building Energy Benchmarking Program dataset permitted formation of robust peer comparison groups for Offices, MURBs, Arenas, Multiplexes, and Education buildings, as detailed in the following sections. As program participation grows and the dataset becomes more granular, Edmonton-specific peer comparison groups will become available for more building types, providing greater transparency to energy performance in the local real estate market.

MURBs have the lowest median EUI, and Recreation properties have the highest median EUI

FIGURE 17: ENERGY USE INTENSITY BY PROPERTY CATEGORY



15 *Note that properties classified as Arenas here are primarily ice rink buildings. Multiplexes may also contain ice rinks, but the majority of the property is dedicated to other functions like fitness centres, pools, saunas, or gymnasiums.*

RETURNING PARTICIPANTS YEAR-OVER-YEAR CHANGES

Over 80% of the properties that participated in Year 1 of the Building Energy Benchmarking Program returned to participate in Year 2 of the program! Year-over-year (YOY) analysis of weather-normalized energy performance was possible for these properties, yielding some interesting results:

Of course, reductions in energy use cannot be *directly* attributable to benchmarking, and are instead a result of specific operational improvements or equipment upgrades. However, the year-over-year results presented here suggest that benchmarking is a key organizational best practice that can help identify opportunities for energy performance improvements, and motivate building owners and operators and implement efficiency projects.

Note that many of the ENERGY STAR Scoring models were updated by NRCan between Year 1 and Year 2 submissions – for this reason, year-over-year Score comparisons are not made in this report. However, score comparisons will be possible between Year 2 and Year 3, and will be discussed in the Year 3 summary report.

RETURNING YEAR 1 PARTICIPANTS KEY FINDINGS*

4.3% reduction in **total energy energy use** by returning participants between 2016 and 2017 (after normalizing for weather)

5.2% reduction **Non-City buildings**

1.7% reduction **City of Edmonton Buildings**

2.6% reduction **Median YOY change in EUI**

* *Results are based on 69 Year 1 participants who returned for Year 2 and reported weather-normalized source energy use intensities for both years.*

Median ENERGY STAR Score for Offices in Year 2: 67

OFFICES

Office properties made up the largest distinct category of properties in Year 2, accounting for 36% of the total gross floor area, and forming the most robust peer comparison group of participants. Offices are eligible for an ENERGY STAR Score in Canada – the chart below shows the Scores for all participant office buildings – the median ENERGY STAR Score of all participating offices is 67 for Year 2. Of the 45 participating offices with ENERGY STAR Scores, 20 have scores of 75 or higher, making them eligible for ENERGY STAR Certification.

Comparisons were also made on a source energy use intensity basis against various available benchmarks, as shown in the table below. The median EUI of the reporting properties is comparable to the best available national, provincial, and Edmonton-specific energy benchmarks (as reflected by existing ENERGY STAR Portfolio Manager entries) for offices.

FIGURE 18: COMPARISON OF AVAILABLE EUI BENCHMARKS FOR OFFICES

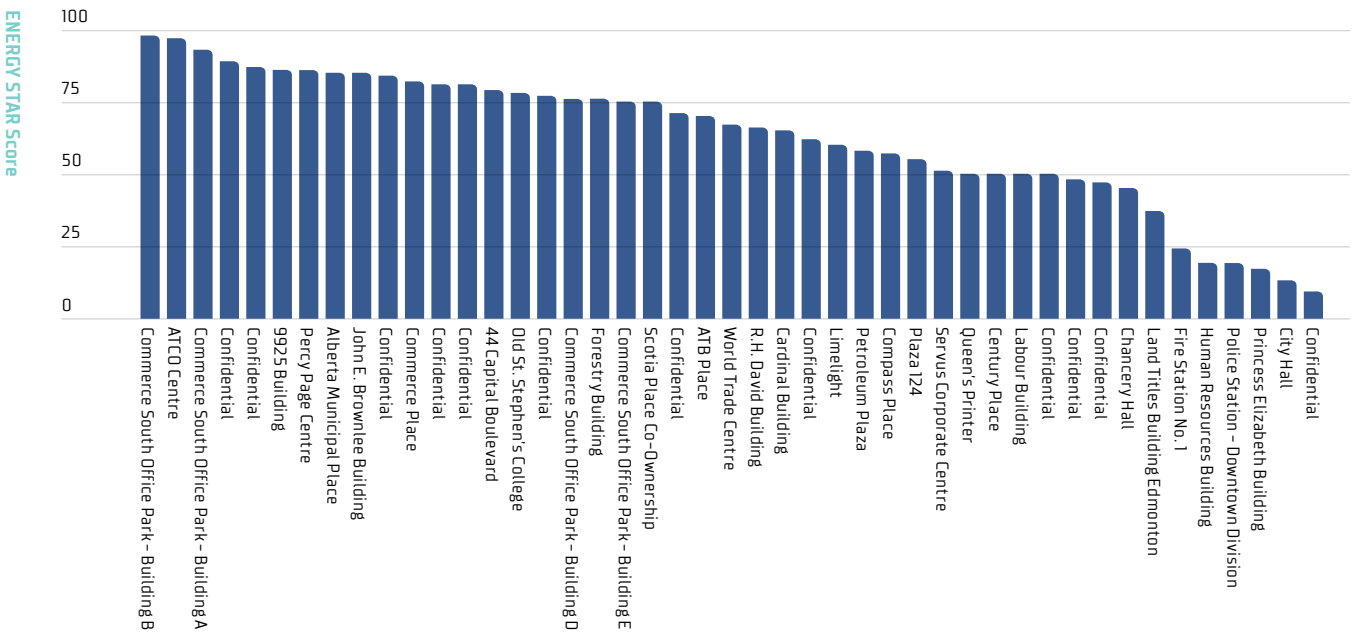
SCIEU National Median*	1.55
Provincial Average†	1.7
ENERGY STAR Portfolio Manager Data Snapshot (Median Office within the City of Edmonton) ‡	1.61–1.63
Median of Year 2 Participants in COE BEBP	1.62

* *Median taken from SCIEU 2014 – Survey of Commercial and Institutional Energy Use in Buildings (Statistics Canada)*

† *Based on StatsCan Comprehensive Energy End Use Database (CEUD–2016) for Offices in Alberta. Average source EUI was estimated using the source–site factors from Portfolio Manager and the energy consumption by fuel source in the CEUD data.*

‡ *Based on Portfolio Manager Data snapshot provided by Natural Resources Canada*

FIGURE 19: DISTRIBUTION OF ENERGY STAR SCORES – OFFICES



MURB participation increased four-fold between Year 1 and Year 2.

MULTI-UNIT RESIDENTIAL BUILDINGS (MURBS)

The energy and emissions performance of multi-unit residential buildings[16] in Canada are not well described in the available literature. There are no statistically representative energy performance databases available to the public nor is there an ENERGY STAR Score available for multi-unit residential buildings in Canada. Though NRCan recently announced the launch of a Canada-wide MURB energy survey in September 2018, a timeline has not been set for the release of the survey data or an ENERGY STAR Score for MURBs in Canada. However, MURB participation in the City's Building Energy Benchmarking Program quadrupled between Year 1 and Year 2 and the dataset now provides specific insight into the energy performance of Edmonton's multi-unit residential real estate market.

In Year 2 of the BEBP, 20 multi-unit residential properties submitted data for calendar year 2017, up from 5 participants in Year 1. The weather-normalized source EUI of these properties (where available) are shown below, ranked from lowest to highest. The data indicate EUIs range from 0.78-2.89 GJ/m^2, with a median of 1.32 GJ/m^2.

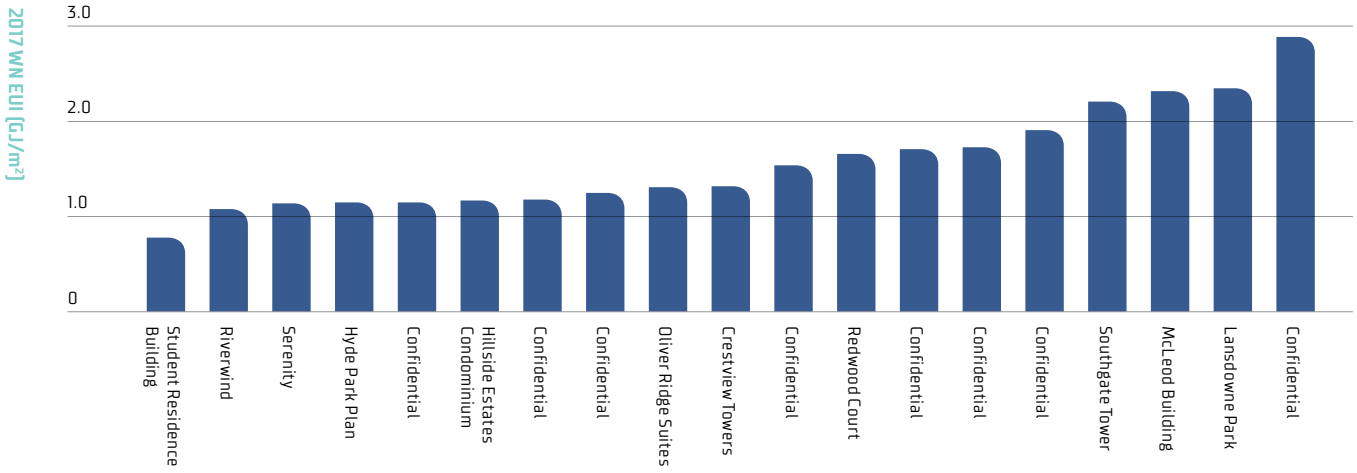
Outside of the results shown below, the only available benchmark specific MURBs in Edmonton comes from Natural Resources Canada, who provided an aggregated data summary of multi-unit residential buildings in Edmonton that were already entered in Portfolio Manager as of January 2018. The median source EUI for these properties was 1.47 GJ/m^2.

FIGURE 21: COMPARISON OF AVAILABLE ENERGY BENCHMARKS FOR MURBS

ENERGY STAR Portfolio Manager Data Snapshot (Median MURB within the City of Edmonton)*	1.47
Median of Year 2 Participants in COE BEBP	1.32

* *Based on a Portfolio Manager Data snapshot of 25 buildings, provided by Natural Resources Canada*

FIGURE 20: DISTRIBUTION OF EUIs – MURBS



16 *Student residences were assumed to be sufficiently similar to apartments/condominium buildings for the purpose of this report*

ENERGY STAR Scores for Arenas in Year 2 ranged from 8 to 54.

ARENAS

Since the Year 1 BEBP report was published, NRCan has released an ENERGY STAR Score for Ice Rinks in Canada, which provides a 1–100 energy performance score normalized for the operational characteristics of the building. The model calculates a Score by accounting for the following operational characteristics:

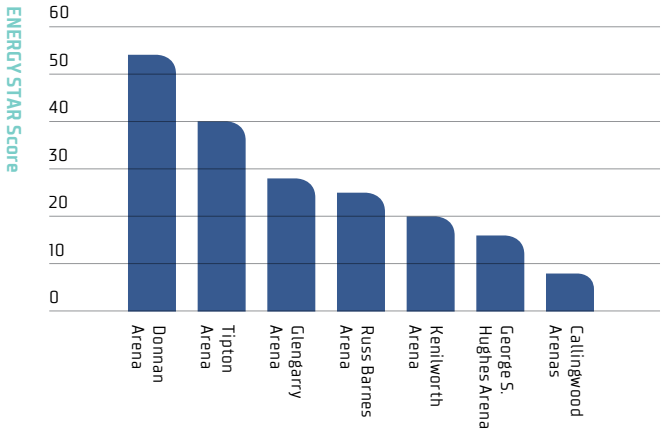
- Months the Rink is Open
- Ice Resurfacings per week
- Number of spectator seats
- Number of workers
- Percent of the total facility GFA that is covered by ice
- Weather
- Number of Curling Sheets

The City of Edmonton submitted eight (8) properties in Year 2, seven (7) of which were eligible for the 1–100 ENERGY STAR Score.[17] The chart to the right shows that ENERGY STAR Scores ranged from 8 to 54. EUIs for the arenas submitted to Year 2 of the program ranged from 1.9 GJ/m^2 to 5.8 GJ/m^2. The 2014 Survey of Energy Consumption in Arenas (SECA 2014) states that the national median source EUI for arenas is 1.76 GJ/m^2.[18]

FIGURE 22: COMPARISON OF AVAILABLE ENERGY BENCHMARKS FOR ARENAS

2014 Survey of Energy Consumption in Arenas – National Median Source EUI	1.76
Median of Year 2 Participants in COE BEBP	2.44

FIGURE 23: DISTRIBUTION OF ENERGY STAR SCORES – ARENAS



17 *One arena was not eligible for the ENERGY STAR Score because the secondary function of the building made up more than 25% of the building GFA. Per NRCan, in order to receive an ENERGY STAR Score, more than 75% of the property's GFA must be a scorable building type.*

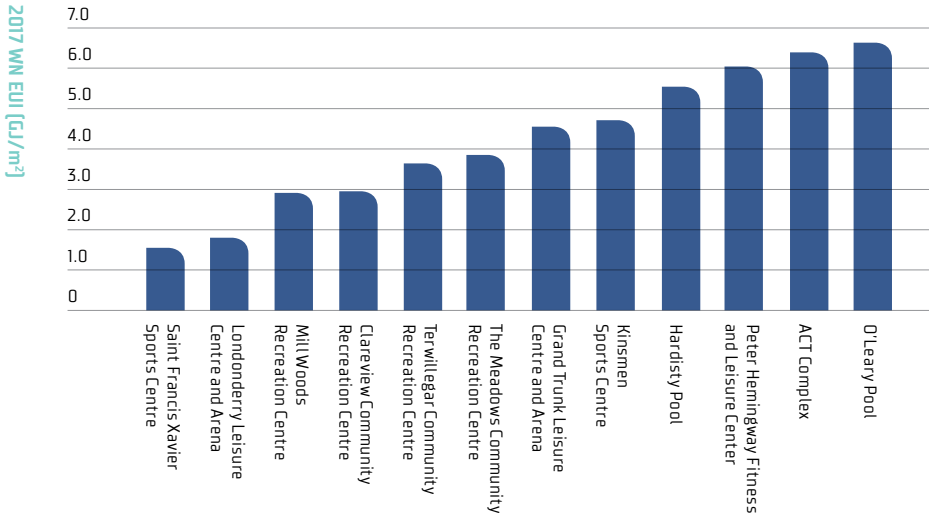
18 *Based on a filtered dataset taken from the 2014 SECA survey provided by NRCan.*

MULTIPLEX

Multiplex facilities were the most energy-intensive property category in both Year 1 and Year 2 of the program.[19] Multiplexes are defined as properties where the majority of the property is dedicated to functions like fitness centres, pools, saunas, or gymnasiums. These multiplexes may also have arenas that comprise more than 50% of the property – since these facilities have significant floor area dedicated to *non-arena* functions, they cannot be scored with the ENERGY STAR Scores for arenas.

This year, 14 multiplex facilities were submitted to the property, 12 of which were submitted by the City of Edmonton. The chart below shows the ranking of EUIs for City properties only – the other 2 properties are not shown to preserve participant data privacy. The relevant national benchmark median EUI is 1.89 GJ/m^2.[20]

FIGURE 24: DISTRIBUTION OF SOURCE EUIs – CITY OF EDMONTON MULTIPLEX FACILITIES



19 *Due to the smaller sample in Year 1, multiplexes and arenas were grouped into the Recreation category*

20 *Based on the CIBEUS Survey for Pools, Skating Rinks, Fitness Centres and Bowling Alleys*

Participation by Education buildings doubled between Year 1 and Year 2.

EDUCATION

The Education category sample increased from 8 to 19 properties between Year 1 and Year 2. This category included a number of different education buildings, including adult education facilities, K-12 schools, corporate training schools, and special needs facilities. In future years, these sub-categories will be broken out into unique categories as data permits. Note that K-12 Schools are unique in that they are eligible to receive an ENERGY STAR Score, though performance for these specific properties will not be shown due to data privacy concerns.

The weather-normalized source EUIs for education buildings ranged from 1.0-3.0 GJ/m^2. The national medians varied slightly based on the subcategory of each type education building submitted (K-12 school vs. adult education), ranging from 1.0-1.4 GJ/m^2.

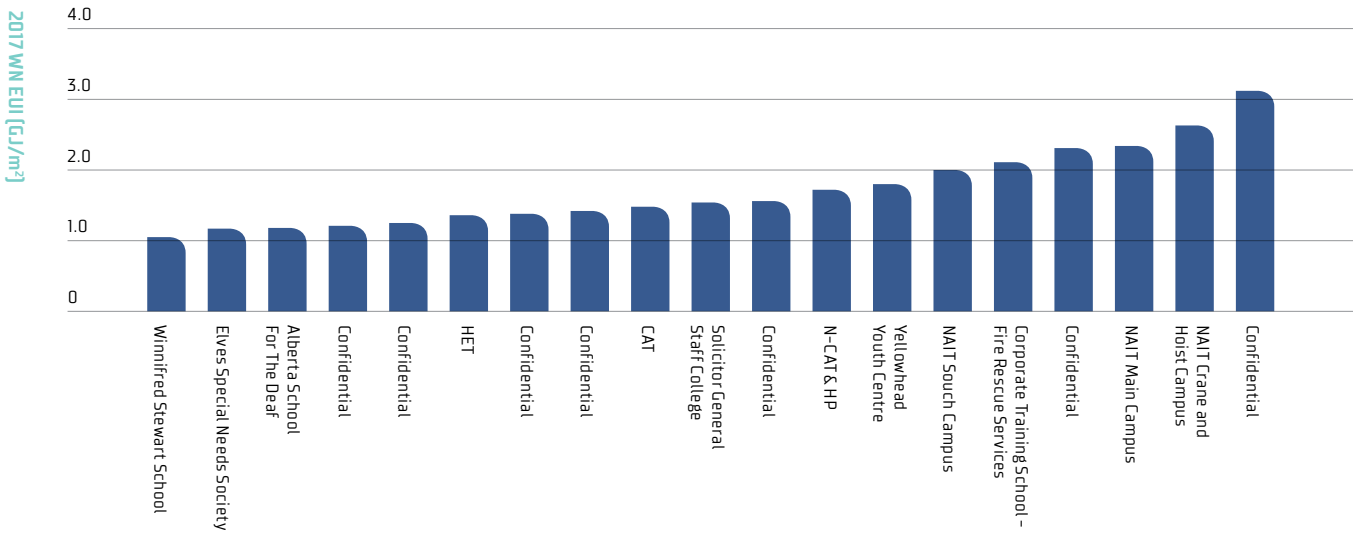
FIGURE 26: COMPARISON OF AVAILABLE ENERGY BENCHMARKS FOR EDUCATION

SCIEU National Median*	1.0-1.4
Provincial Average†	1.9
Median of Year 2 Participants in COE BEBP	1.54

* *Medians assigned in Portfolio Manager, based on SCIEU 2014 - Survey of Commercial and Institutional Energy Use in Buildings (Statistics Canada)*

† *Based on StatsCan Comprehensive Energy End Use Database (CEUD-2016) for Educational Service Buildings in Alberta. Median source EUI was estimated using the source-site factors from Portfolio Manager and the energy consumption by fuel source in the CEUD data.*

FIGURE 25: DISTRIBUTION OF SOURCE EUIs – EDUCATION BUILDINGS



OTHER BUILDINGS

Year 2 of the program attracted participation from a wide variety of organizations and property types. The sample had sufficient data to permit forming the five peer comparison groups discussed above (Office, MURB, Arena, Multiplex, Education), which covered two thirds of the Year 2 sample. However, the remaining third of the sample (53 buildings) fell into categories that had few (or no) similar properties, and for which no peer comparison groups could be formed. These categories included:

- **Retail** Enclosed malls and strip malls
- **Warehouses** Distribution centres and non-refrigerated warehouses
- **Libraries**
- **Other** Includes hotels, laboratories, convention centres, fire stations etc.

Note that City Hall's building type will be changed from Office to "Public Assembly" in Year 3 to provide a more accurate representation and comparison opportunity.

Although peer comparison was not possible for this category of buildings, comparisons against applicable benchmarks and year-over-year comparisons were possible, with the following key findings:

PERFORMANCE HIGHLIGHTS

SOUTHGATE CENTRE

REGISTERED BY: Ivanhoe Cambridge
PROPERTY TYPE: Enclosed Mall

4.7% reduction in year-over-year energy use

59% more efficient than the national median for enclosed malls

ROBBINS HEALTH LEARNING CENTRE

REGISTERED BY: MacEwan University
PROPERTY TYPE: Mixed Use Property

3.8% reduction in year-over-year energy use

NORTHERN ALBERTA JUBILEE AUDITORIUM

REGISTERED BY: Government of Alberta
PROPERTY TYPE: Performing Arts Centre

2.4% reduction in year-over-year energy use

10% more efficient than the national median for public assembly buildings

WHAT'S NEXT

AWARDS

The City of Edmonton will be hosting an event in Spring 2019 to formally recognize all Year 2 participants. At this event the City will be sharing the findings of the data analysis, distributing individual building scorecards, and presenting performance and leadership awards. Awards will be presented to the winner and runner-up participants in each of the following categories:

HIGHEST PERFORMING OFFICE CATEGORY

Based on participant ranking by ENERGY STAR Score

Winner: Commerce South Office Park – Building B – Bentall Kennedy Canada

Runner-up: ATCO Centre – Triovest Realty Advisors

HIGHEST PERFORMING MULTI-UNIT RESIDENTIAL BUILDING CATEGORY

Awarded to best MURB building with year-round occupancy, based on Weather-normalized Source EUI

Winner: Riverwind – Riverwind Strata Title Housing Co-op

Runner-up: Serenity – Serenity Condominium Corp.

HIGHEST PERFORMING EDUCATION CATEGORY

Based on participant ranking by Weather-normalized Source EUI

Winner: Winnifred Stewart School – Alberta Infrastructure

Runner-up: Elves Special Needs Society – Aenergy Capital

HIGHEST PERFORMING OTHER CATEGORY

Based on comparison to the relevant National Median EUI for participants' property type

Winner: Southgate Centre – Ivanhoe Cambridge

Runner-up: Single Men's Hostel Edmonton – Alberta Infrastructure

BEST OVERALL ENERGY PERFORMANCE

Awarded to the participant with the lowest EUI among all Year 2 participants

Winner: Student Residence Building – MacEwan University

BEST YEAR-OVER-YEAR IMPROVEMENT

Based on ranking of improvement between Year 1 and Year 2 weather normalized EUI

Winner: Infrastructure Shops – Alberta Infrastructure – 21% YOY energy reduction

Runner-up: 9925 Building – Triovest Realty Advisors – 19% YOY energy reduction

LEADERSHIP IN TRANSPARENCY AWARD

Presented to non-government registrant organizations that submitted the greatest number of buildings consenting to building-level disclosure

Winner: Northern Alberta Institute of Technology (NAIT) – 9 Buildings

Runner-up: Humford Management – 8 Buildings

YEAR 3 PLANS

RECRUITMENT

After two years of strong participation in the program the City of Edmonton is looking to engage more of Edmonton's buildings in this benchmarking initiative. By signing up to participate in Edmonton's Building Energy Benchmarking program, participants will join a group of industry leaders that are working to understand the energy and greenhouse gas impacts and performance of their buildings and incorporate this into decision making.

Participating buildings must be located within Edmonton's city limits and must qualify as a commercial, light industrial, institutional, mixed-use, or multi-unit residential building type. Launching in summer 2019, Year 3 efforts will aim to have an **anticipated data submission deadline of September, 2019.**

EVALUATION

Following the three-year introductory program, the City will evaluate the impacts of the initiative, and consider ways to maintain and expand benchmarking and disclosure support its market transformation objectives in the commercial building sector. The key performance indicators used to assess the program impacts are:

- Participation rates and diversity
- Participant/nonparticipant awareness and satisfaction
- Impacts on participant behavior and actions
- Data quality and effectiveness of the benchmarking tools
- Energy and GHG impacts
- Market transformation contributions
- Program delivery processes

CALL FOR PARTICIPATION – JOIN YOUR PEERS ALREADY PARTICIPATING.

If you are interested in participating in Year 3 of the benchmarking program, please visit the Building Energy Benchmarking Program website (**edmonton.ca/energybenchmarking**). Here you will find program updates, details on benchmarking support services, timelines and the registration form. If you have any questions, please email **energystar@edmonton.ca**.

AVAILABLE INCENTIVE PROGRAMS

CITY OF EDMONTON

- Edmonton's **Commercial Energy Audit Rebate Program** is available to all benchmarking program participants, making them eligible for up to $10,000 (or 50% of the total cost, the lesser of the two) per building financial rebate towards a commercial energy audit of their building. A maximum of 3 rebates are available per building ownership group per year. Eligibility criteria and application details are available at edmonton.ca/energybenchmarking.

ENERGY EFFICIENCY ALBERTA

- The **Business Energy Savings Program** offers rebates for the purchase of energy efficient products and equipment. Business Energy Savings offers incentives to businesses, non-profits and institutional organizations to encourage them to choose high-efficiency products. Incentives of up to $25,000 per facility (or $100,000 for parent companies) are available to help cover the cost of the equipment.
- The **Custom Energy Solutions Program** helps industrial, institutional, and commercial customers with facilities operating within the Province of Alberta improve productivity, save energy and save money by upgrading inefficient equipment and making other energy improvements. Depending on the facilties GHG emissions they can be eligible for incentives up to $1 million per year and parent facilities implementing Custom Energy Solutions projects in multiple facilities are eligible for incentives up to $2 million per year. Facilities with less than 10,000 tonnes are eligible for incentives up to $250,000 per year for individual facilities and $500,000 per year for parent facilities.
- Non-Profits (including educational facilities) in Alberta can take advantage of the **Non-Profit Energy Efficiency Transition (NEET)** program. Direct installations of basic energy efficiency upgrades to eligible non-profit and volunteer-based organizations at no charge. In addition to the no-charge upgrades, new applicants will also receive an on-site energy efficiency review to identify other energy-saving opportunities that may be eligible for incentives under other Energy Efficiency Alberta programs.
- **Residential and Commercial Solar Program** offers rebates to homeowners, businesses and non-profits that install rooftop solar photovoltaic (PV) systems to a maximum of $1,000,000 or 35% of eligible system costs.

MUNICIPAL CLIMATE CHANGE ACTION CENTRE

- The Municipal Climate Change Action Centre offers programs to help municipalities and community-related organizations address climate change through mitigation and resiliency planning.
- The **Recreation Energy Conservation (REC) program** helps municipally-owned recreation facilities reduce energy use and GHG emissions by providing financial incentives to help identify and implement energy-saving projects. Through REC, municipalities can receive incentives for Scoping Audits and Engineering Studies that support investment decisions in addition to incentives for implementing energy efficient retrofits in their facilities. Examples of eligible facilities are arenas, curling rinks, aquatic centres, multiplexes and dry sports centres.
- The **Solar for Schools Program (SFS)** provides financial rebates to Alberta Public School Authorities who install solar photovoltaic (PV) systems on existing school facilities or land in their jurisdiction and complete a student education initiative as part of the project.
- The **Alberta Municipal Solar Program** provides financial incentives to Alberta municipalities who install grid connected solar photovoltaics (PV) on municipal facilities or land and complete public engagement for the project. Program details, application forms and eligibility criteria can be found at mccac.ca

ENERGY STAR CERTIFICATION

- Certified buildings will be able to display the ENERGY STAR symbol on their building, identifying it as a top performer in terms of energy efficiency. To qualify, your building will need a 1-100 ENERGY STAR score of at least 75, meet certain other eligibility criteria, and have your application verified by a licensed professional. Details available by searching **nrcan.gc.ca/energy/ efficiency/ buildings**

BUILDING SHOWCASES

AMP BUILDING

The AMP Building is a 61,000 sq-ft (6,140 m^2), 3-storey office building constructed in 1982. The building is managed by Humford Management Inc. and is a repeat participant in the City's Building Energy Benchmarking Program. In Year 2, the AMP Building reported an ENERGY STAR Score of 85, ranking 8th out of 45 Office participants. The building's weather-normalized source EUI of 1.37 GJ/m^2 is 3.1% lower than the weather-normalized EUI reported in Year 1 of the program. AMP Building is BOMA BEST Certified (2013) and will be pursuing recertification this year.

The building contains a number of interesting energy efficiency features, including a natural gas-fired cogeneration system that provides heat and electricity to the building. The building is lit by T5 and compact fluorescent lighting, as well as exterior LED lighting. Alberta Municipal Place also has low-flow bathroom fixtures, motion-activated lighting, and small solar panel and wind turbine installations.

The Alberta Municipal Place intends to participate in Year 3 of the City's Building Energy Benchmarking Program.

In Year 2, the AMP Building reported an ENERGY STAR Score of 85, ranking 8th out of 45 Office participants.

ELVES SPECIAL NEEDS SOCIETY

The Elves Adult and Youth Centre is a 3,600 m^2 complex that includes a main building originally constructed in 1955, and several additions constructed between 2000 and 2014. The Elves Special Needs Society facility provides individuals with severe disabilities and special needs with a unique, individualized educational or day program to promote their development and to enhance the quality of life for the individuals and their families. The facility includes space for educational activities, medical treatment and physiotherapy areas, and activity and meeting spaces for families and caregivers.

The Elves Special Needs Society actively seeks opportunities to minimize energy costs through both supply and demand side management; they established a Green Committee to explore and implement opportunities. Among the projects implemented was a replacement of all the windows from 2009–2013 in their original building. Additionally, they are a member of the Association of Independent Schools and Colleges of Alberta (AISCA) Energy Management Program. This Program, founded in 2006, provides supply side energy management by securing forward market purchases of energy. Additional, the Program periodically hosts workshops on various topics including energy efficiency and market updates.

A detailed Capital Replacement Fund Study was conducted in 2010 to assess the facility's condition, prioritize systems requiring repair or replacement, and identify opportunities for efficiency. Additionally, Elves Special Needs Society is participating in the Aenergy Capital Inc. (AEC) Building Renewal and Efficiency Savings Program. Under the guidance of AEC and AISCA, Elves enrolled in the ENERGY STAR Portfolio Manager to monitor energy consumption on an ongoing basis; and (2) are participating along with 44 other schools throughout Alberta in the Low Carbon Economy Challenge to obtain grant funding for building energy efficiency retrofits. As part of this program, they intend to convert over 750 T8 and T12 fixtures to LEDs.

ELVES is participating in the Low Carbon Economy Challenge to obtain grant funding for building energy efficiency retrofits.

HERITAGE TOWER

NorQuest College's Civic Employees Legacy Tower (CELT) and Singhmar Centre for Learning (SCFL) are located in downtown Edmonton's Education District. The 8-storey CELT was built in 1971 and is currently undergoing major renovations while remaining operational. The adjoining SCFL was substantially completed in 2017 and features 24 classrooms, 26 labs, the 1000 Women Child Care Centre, an Indigenous Student Centre, many vibrant student spaces, and more. These two buildings share a new central heating plant, which replaced the individual plant that served the CELT prior to the SCFL construction.

As part of the CELT renewal, NorQuest College is undertaking significant energy efficiency retrofits. Pumps and fans are being replaced with variable speed drives, new heating and cooling coils, and 75% of the piping infrastructure is being replaced. The CELT roof now has increased insulation and all exterior glazing units have been replaced. NorQuest College would like to acknowledge the support of the Innovation, Science and Economic Development Canada's Strategic Investment Fund for the CELT roof and glazing projects.

The SCFL is pursuing LEED© Silver for New Construction, and the college hopes to receive the official certification from the Canada Green Building Council in spring 2019.

Pumps and fans are being replaced with variable speed drives, new heating and cooling coils, and 75% of the piping infrastructure is being replaced.

HI EDMONTON

Originally used as a convent, HI Edmonton was built in 1960 and converted to a backpacker hostel in 1998. The hostel welcomes guests from Canada and around the world, hosting up to 124 at a time. The 20,000 square foot facility also includes kitchens, social spaces, meeting rooms, and a large common space, formerly the convent's chapel, which is used yearly as an Edmonton Fringe Festival performance venue.

The building's journey to improved energy efficiency started several years ago with internal benchmarking done to compare hostels in Western Canada. HI Edmonton was identified as a gaz-guzzler among its hostel peers, and a preliminary audit was done to identify potential solutions. The non-profit was then able to access funding through the Non-Profit Energy Efficiency Transition (NEET) Program to conduct a full ASHRAE Level II energy audit. Following the audit's recommendations, many energy conserving features have been installed, including new condensing boilers, a domestic hot water recirculation pump, and sensor or photocell controls on all outdoor lighting. Operational changes also contributed to reduced energy use, such as using boiler controls to schedule hot water temperature based on the time of day. Hostel staff are engaged in the energy efficiency project as well and are encouraged to consider their energy use while at work by turning off unnecessary lights. All of this hard work has paid off: HI Edmonton saw a 14% reduction in weather-normalized energy use between 2016 and 2017.

HI Edmonton is now working on converting all of their indoor lighting to LED to achieve even greater energy efficiency. Their western canadian management organization is also working to implement a strategic energy management plan, including an overarching goal to reduce the organization's CO2 emissions by 30% by 2030 in alignment with the Paris Accord goals.

HI Edmonton saw a 14% reduction in weather-normalized energy use between 2016 and 2017.

RIVERWIND

After being recognized as the top performing MURB in Year 1 of the City's Building Energy Benchmarking Program, the Riverwind Strata Title Co-op has returned in Year 2 for another strong showing. This year, Riverwind property was the top-ranking residential property (with year-round occupancy), with a weather-normalized EUI of 1.08 GJ/m^2. This represents a 2.2% improvement in weather-normalized EUI between Year 1 and Year 2, illustrating how benchmarking can enhance energy literacy and motivate action.

Riverwind Strata Title Co-op is comprised of two 19-storey buildings connected by a shared parkade and provides over 90 homes for Edmonton residents. After retrofitting common areas with LEDs, the board of directors offered residents the opportunity to retrofit their in-suite lighting to LED fixtures in mid-2018. Supported by Energy Efficiency Alberta's Residential No-Charge Energy Savings Program, the board was able to retrofit over 50% of all suites, immediately delivering on-bill savings for owners. Low-flow faucet fixtures were also installed, resulting in energy savings from the central water heaters.

The board undertook an energy audit in November 2018, and took advantage of the City of Edmonton energy audit rebate. The board expects to implement some of the recommendations in 2019, and continues to investigate adding Electric Vehicle charging stations and solar PV. Riverwind has already requested whole-building aggregate electricity data for calendar year 2018, and are looking forward to participating in Year 3 of the City's benchmarking program!

Riverwind property was the top-ranking residential property with year-round occupancy, with a weather with a weather-normalized EUI of 1.08 GJ/m^2.

WINNIFRED STEWART SCHOOL

The Winnifred Stewart School is a two-storey school operated by the Government of Alberta that provides day-school programming to persons with mental or physical disabilities. Built in three stages between 1953 and 1974, the 8,600 m^2 school is occupied by the Winnifred Stewart Society, who are dedicated to helping individuals with disabilities lead fulfilling lives and become integral members of their communities.

The building is heated by three atmospheric pressure boilers, with no mechanical cooling or air conditioning. Plug loads (e.g. computers, monitors etc.) are relatively low due to the nature of the facility, resulting in a low energy use intensity (EUI) at the property – the school is 26% more efficient than the national median EUI for Adult Education facilities. More importantly, the Winnifred Stewart School has achieved a 2.1% reduction in weather-normalized energy use between Year 1 and Year 2. Energy savings are attributable to retrofitting aging T12 lighting fixtures with more efficient T8 fixtures on burnout, while significant water savings have been achieved by replacing timed-flush urinals with handle-activated flushometers.

Alberta Infrastructure endeavors to reduce energy consumption and environmentally harmful emissions, and believes sustainable operating practices are vital to assist the global effort to mitigate climate change. By conducting ASHRAE Level 1 and Level 2 energy audits each year, Alberta Infrastructure identifies energy conservation measures and implements energy efficiency projects for its buildings accordingly.

Image Source: Bluefish Studios

The Winnifred Stewart School is 26% more efficient than the national median EUI for Adult Education facilities.

EDMONTON CONVENTION CENTRE

The Edmonton Convention Centre (formerly Shaw Conference Centre) officially opened its doors on June 22, 1983 and is recognized by the International Association of Venue Managers (IAVM) as one of North America's top five performing venues. As a division of Edmonton Economic Development, the convention centre hosts around 650 events each year with over 500,000 guests. The centre has over 360,000 square feet of usable space and uses a cutting edge energy use per attendee measurement to right size meeting rooms to events, minimize energy and increase occupancy.

The building's construction was revolutionary, with over 70% being built underground, which helps to greatly mitigate its' cooling and heating needs. Other unique features include rooftop permaculture that helps insulate the building, indoor greenery to help air quality, a monarch butterfly preservation garden and an apiary that harvests over 90 lbs of honey each year for use in the kitchens.

The convention centre's sustainability strategy also looks at how much energy is used when people are not in the building and has implemented behavioural measures to reduce lighting and heating/cooling while events are being set up and taken down and educating security staff on turning off lights during building checks. A full time sustainability manager was hired in 2018 to implement the four year sustainability strategy that aligns with the City of Edmonton's goals of reducing GHG emissions 35% by 2035. The Edmonton Convention Centre was the first conference venue in Canada to receive the Green Key level 5 certification.

The convention centre is undergoing upgrades and rehabilitation in 2019. The extensive glazing that covers the massive atrium (10 storeys high) will be upgraded and reduce heating in the winter and cooling in the summer as well as installing Building Integrated Photo-Voltaics (BIPV) into the replacement. This BIPV system is targeting 220 kW of electricity production annually, making it the largest BIPV system (and 6th largest PV system) in Canada. The upgrades will also include new LED light fixtures which should reduce lighting required power by 50% and contribute to a decrease in annual energy consumption by 10% (excluding the PV system).

The Edmonton Convention Centre will be participating in year 3 of the Building Energy Benchmarking program and will continue their established practice of energy transparency while challenging the community to follow their impressive lead.

The building's construction was revolutionary, with over 70% being built underground.

PRINCE OF WALES ARMOURIES

Completed in 1915, the Prince of Wales Armouries was a military training site and munitions repository for the Department of National Defence until 1977. The two-storey sandstone and brick building resembles a medieval castle with its' corner turrets giving the building a fortress-like appearance. Over the years it was home to several regiments, including the Loyal Edmonton Regiment and more recently housing local not for profit organizations including the Edmonton Arts Council, Heritage Council and Sports council.

In 1992 the City of Edmonton Archives were relocated into a purpose built building constructed within the historic Prince of Wales Armouries walls. The archives houses civic government and private records of enduring significance that document Edmonton's history. With two sub basements and walls thick enough to house munitions and large weapons the building enjoys passive climate moderation in the summer by curtailing cooling requirements.

In 2019 the Armouries existing boilers are being replaced with new high efficiency boilers along with a new controls system to maximize the energy efficiency of the heating system. A number of heat pumps are also being replaced with more efficient units. In 2016 the Armouries EUI was 1.37 GJ/m^2 rising to 1.45 GJ/m^2 in 2017. These building upgrades will help to lower the buildings EUI and improve energy efficiency.

With two sub basements and walls thick enough to house munitions and large weapons the building enjoys passive climate moderation in the summer by curtailing cooling requirements.

Image Source: https://fr.wikipedia.org/wiki/Fichier:Prince_of_Wales_Armouries_Edmonton_Alberta_Canada_04A.jpg

APPENDICES

APPENDIX A:
FULL PARTICIPANT DATA

Callingwood Arenas	City of Edmonton	6,500	1985	Ice/Curling Rink	Arena	8	3.79	385.6
Confederation Arena & Leisure Centre	City of Edmonton	6,100	1973	Ice/Curling Rink	Arena	NA	5.82	477.4
Donnan Arena	City of Edmonton	2,100	1970	Ice/Curling Rink	Arena	54	1.91	195.8
George S. Hughes Arena	City of Edmonton	2,700	1958	Ice/Curling Rink	Arena	16	2.51	241.9
Glengarry Arena	City of Edmonton	2,300	1970	Ice/Curling Rink	Arena	28	2.36	226.0
Kenilworth Arena	City of Edmonton	2,900	1959	Ice/Curling Rink	Arena	20	3.31	323.5
Russ Barnes Arena	City of Edmonton	2,700	1963	Ice/Curling Rink	Arena	25	2.24	206.5
Tipton Arena	City of Edmonton	2,200	1970	Ice/Curling Rink	Arena	40	2.02	204.9
Elves Special Needs Society	Aenergy Capital	3,700	1955	K-12 School	Education	23	1.17	98.0
Headway School	Aenergy Capital	2,300	1965	K-12 School	Education	NA	NA	NA
MAC Islamic School	Aenergy Capital	2,100	1985	K-12 School	Education	NA	NA	NA
Parkland Immanuel	Aenergy Capital	4,200	1977	K-12 School	Education	NA	NA	NA
Waldorf Independent School of Edmonton (WISE)	Aenergy Capital	1,700	1951	K-12 School	Education	NA	NA	NA
Alberta School For The Deaf	Alberta Infrastructure	20,700	1980	Other - Education	Education	NA	1.18	83.9
Solicitor General Staff College	Alberta Infrastructure	7,100	1980	Adult Education	Education	NA	1.54	124.5
Winnifred Stewart School	Alberta Infrastructure	8,600	1980	Adult Education	Education	NA	1.05	85.2
Yellowhead Youth Centre	Alberta Infrastructure	9,800	1980	Adult Education	Education	NA	1.80	147.8
Corporate Training School - Fire Rescue Services	City of Edmonton	3,700	1953	Adult Education	Education	NA	2.11	185.8
Winterburn Training Centre	EPCOR Utilities Inc.	900	2016	Vocational School	Education	NA	NA	NA
CAT	NAIT	47,100	2016	Adult Education	Education	NA	1.48	139.8
HET	NAIT	2,800	2015	Vocational School	Education	NA	1.36	114.0
N-CAT & HP	NAIT	35,200	2002	Adult Education	Education	NA	1.72	171.9
NAIT Crane and Hoist Campus	NAIT	1,100	2016	Vocational School	Education	NA	2.63	225.4
NAIT Main Campus	NAIT	127,600	1962	Vocational School	Education	NA	2.34	208.1
NAIT Patricia Campus	NAIT	11,400	1975	Vocational School	Education	NA	NA	NA
NAIT South Campus	NAIT	13,400	1996	Vocational School	Education	NA	2.00	181.1
Heritage Tower/SCFL	NorQuest College	36,400	1970	College/University	Education	NA	NA	NA
Highlands Library	City of Edmonton	1,900	2013	Library	Library	NA	1.44	158.5
Jasper Place Library	City of Edmonton	1,500	2013	Library	Library	NA	1.53	157.6
Lois Hole Library	City of Edmonton	2,400	2007	Library	Library	NA	1.97	191.6
Prince of Wales Armouries	City of Edmonton	9,400	1913	Library	Library	NA	1.45	126.2
YMCA Castle Downs	Aenergy Capital	6,000	1998	Fitness Center/ Health Club/Gym	Multiplex	NA	NA	NA

Report Name	Registrant Organization	Gross Floor Area (m^2)	Year Built	Primary Property Type	Property Category	ENERGY STAR Score	2017 WN EUI (GJ/m^2)	GHG Emissions Intensity ($kg\ CO2e/m^2$)
YMCA Jamie Platz	Aenergy Capital	6,000	1990	Fitness Center/ Health Club/Gym	Multiplex	NA	NA	NA
ACT Complex	City of Edmonton	5,200	1981	Fitness Center/ Health Club/Gym	Multiplex	NA	6.39	511.4
Clareview Community Recreation Centre	City of Edmonton	37,600	2013	Fitness Center/ Health Club/Gym	Multiplex	NA	2.95	271.9
Grand Trunk Leisure Centre and Arena	City of Edmonton	6,100	1975	Fitness Center/ Health Club/Gym	Multiplex	NA	4.55	408.3
Hardisty Pool	City of Edmonton	2,200	1975	Fitness Center/ Health Club/Gym	Multiplex	NA	5.54	501.0
Kinsmen Sports Centre	City of Edmonton	21,900	1971	Fitness Center/ Health Club/Gym	Multiplex	NA	4.71	371.5
Londonderry Leisure Centre and Arena	City of Edmonton	6,400	1971	Fitness Center/ Health Club/Gym	Multiplex	NA	1.80	178.4
Mill Woods Recreation Centre	City of Edmonton	20,000	1979	Fitness Center/ Health Club/Gym	Multiplex	NA	2.91	247.0
O'Leary Pool	City of Edmonton	3,600	1962	Fitness Center/ Health Club/Gym	Multiplex	NA	6.63	476.9
Peter Hemingway Fitness and Leisure Center	City of Edmonton	4,300	1970	Fitness Center/ Health Club/Gym	Multiplex	NA	6.04	450.0
Saint Francis Xavier Sports Centre	City of Edmonton	5,300	2010	Fitness Center/ Health Club/Gym	Multiplex	NA	1.55	174.4
Terwillegar Community Recreation Centre	City of Edmonton	33,500	2010	Fitness Center/ Health Club/Gym	Multiplex	NA	3.64	365.9
The Meadows Community Recreation Centre	City of Edmonton	25,000	2013	Fitness Center/ Health Club/Gym	Multiplex	NA	3.85	379.7
Hillside Estates Condominium	Aenergy Capital	35,500	1973	Multifamily Housing	MURB	NA	1.17	93.5
Hyde Park Plan	Aenergy Capital	18,000	1970	Multifamily Housing	MURB	NA	1.15	89.4
Royal Oak Condominium Corporation	Aenergy Capital	7,500	1969	Multifamily Housing	MURB	NA	NA	NA
Strathcona House	Aenergy Capital	15,600	1968	Multifamily Housing	MURB	NA	NA	NA
The Vainer	Aenergy Capital	15,000	2008	Multifamily Housing	MURB	NA	NA	NA
Westcliffe Arms	Aenergy Capital	9,300	1972	Multifamily Housing	MURB	NA	NA	NA
Galbraith House	Boardwalk Rental Communities	11,700	1972	Multifamily Housing	MURB	NA	NA	NA
Lansdowne Park	Boardwalk Rental Communities	5,300	1969	Multifamily Housing	MURB	NA	2.35	164.8
Redwood Court	Boardwalk Rental Communities	13,000	1977	Multifamily Housing	MURB	NA	1.66	106.0
Southgate Tower	Boardwalk Rental Communities	17,300	1971	Multifamily Housing	MURB	NA	2.21	145.0
Oliver Ridge Suites	Go LED Now, Inc.	3,100	1963	Multifamily Housing	MURB	NA	1.31	92.1
Crestview Towers	Go Net Zero, Inc.	5,600	1963	Multifamily Housing	MURB	NA	1.32	93.7
The Maxx	GreyJay Energy	12,000	2012	Multifamily Housing	MURB	NA	NA	NA
The Zen	GreyJay Energy	9,600	2009	Multifamily Housing	MURB	NA	NA	NA
Student Residence Building	MacEwan University	32,900	2006	Multifamily Housing	MURB	NA	0.78	65.9
McDougall Place	McDougall Place Condominium Corporation	8,400	1979	Multifamily Housing	MURB	NA	NA	NA

Report Name	Registrant Organization	Gross Floor Area (m^2)	Year Built	Primary Property Type	Property Category	ENERGY STAR Score	2017 WN EUI (GJ/m^2)	GHG Emissions Intensity ($kg\ CO2e/m^2$)
McLeod Building	McLeod Condo Corp 0322757	5,900	2003	Multifamily Housing	MURB	NA	2.32	165.6
Riverwind	Riverwind Strata Title Housing Cooperative Ltd.	15,700	1989	Multifamily Housing	MURB	NA	1.08	95.6
Serenity	Serenity Condominium – Condo Corp 092 7089	8,200	2009	Multifamily Housing	MURB	NA	1.14	117.3
Victoria Plaza	Victoria Plaza	9,300	1972	Multifamily Housing	MURB	NA	1.62*	120.4
John E. Brownlee Building	Alberta Infrastructure	71,400	1980	Office	Office	85	1.16	134.6
Land Titles Building Edmonton	Alberta Infrastructure	5,700	1980	Office	Office	37	1.80	175.3
Old St. Stephen's College	Alberta Infrastructure	5,600	1980	Office	Office	78	1.27	108.7
Percy Page Centre	Alberta Infrastructure	8,800	1980	Office	Office	86	1.14	110.9
Queen's Printer	Alberta Infrastructure	4,300	1980	Office	Office	50	1.69	159.5
9Triple8	Bentall Kennedy (Canada) Limited Partnership	19,500	1978	Office	Office	NA	NA	NA
Canadian Western Bank Place	Bentall Kennedy (Canada) Limited Partnership	39,400	1981	Office	Office	NA	NA	NA
Commerce South Office Park – Building A	Bentall Kennedy (Canada) Limited Partnership	8,500	2014	Office	Office	93	1.23	129.9
Commerce South Office Park – Building B	Bentall Kennedy (Canada) Limited Partnership	10,100	1982	Office	Office	98	1.02	110.5
Commerce South Office Park – Building D	Bentall Kennedy (Canada) Limited Partnership	7,400	2008	Office	Office	76	1.79	197.5
Commerce South Office Park – Building E	Bentall Kennedy (Canada) Limited Partnership	6,500	2008	Office	Office	75	1.54	179.0
Sun Life Place	Bentall Kennedy (Canada) Limited Partnership	31,700	1978	Office	Office	NA	NA	NA
18520 Stony Plain Road NW	BGIS	9,300	1990	Office	Office	NA	NA	NA
Century Place	City of Edmonton	26,200	1974	Office	Office	50	2.74	294.6
Chancery Hall	City of Edmonton	13,200	1966	Office	Office	45	2.06	200.8
City Hall	City of Edmonton	13,200	1992	Office	Office	13	3.02	265.4
Fire Station No. 1	City of Edmonton	3,400	1982	Office	Office	24	2.12	208.5
Police Station – Downtown Division	City of Edmonton	23,800	1982	Office	Office	19	2.76	292.0
Eastgate Facility	EPCOR Utilities Inc.	1,200	1995	Office	Office	NA	NA	NA
Hugh J. Bolton Service Centre	EPCOR Utilities Inc.	37,300	1981	Office	Office	NA	NA	NA
South Service Centre	EPCOR Utilities Inc.	9,400	1980	Office	Office	NA	NA	NA

Report Name	Registrant Organization	Gross Floor Area (m^2)	Year Built	Primary Property Type	Property Category	ENERGY STAR Score	2017 WN EUI (GJ/m^2)	GHG Emissions Intensity ($kg\ CO2e/m^2$)
Transportation and Meter Services	EPCOR Utilities Inc.	12,300	1979	Office	Office	NA	NA	NA
Alberta Municipal Place	Humford Management Inc	6,100	1981	Office	Office	85	1.37	129.5
Cardinal Building	Humford Management Inc	3,100	1979	Office	Office	65	1.43	145.8
Compass Place	Humford Management Inc	8,800	1974	Office	Office	57	2.09	188.2
Energy Square	Humford Management Inc	12,800	1978	Office	Office	NA	NA	NA
Limelight	Humford Management Inc	3,100	1964	Office	Office	60	1.52	110.2
Plaza 124	Humford Management Inc	16,500	1983	Office	Office	55	2.08	204.0
R.H. David Building	Humford Management Inc	3,100	1951	Office	Office	66	1.54	120.4
World Trade Centre	Humford Management Inc	7,500	1952	Office	Office	67	1.60	143.3
Royal Bank Building	Melcor Developments Ltd.	15,900	1964	Office	Office	NA	NA	NA
44 Capital Boulevard	Morguard Investments Limited	39,400	1981	Office	Office	79	1.55	169.8
Petroleum Plaza	Morguard Investments Limited	29,200	1972	Office	Office	58	1.99	186.0
Scotia Place Co-Ownership	Morguard Investments Limited	82,100	1982	Office	Office	75	1.38	151.6
Human Resources Building	NAIT	1,500	1960	Office	Office	19	1.84	155.5
Princess Elizabeth Building	NAIT	1,400	1965	Office	Office	17	2.23	210.2
Commerce Place	QuadReal Property Group	82,200	1989	Office	Office	82	1.59	170.7
Forestry Building	QuadReal Property Group	13,800	1979	Office	Office	76	1.78	183.8
Labour Building	QuadReal Property Group	9,900	1968	Office	Office	50	1.94	179.6
Servus Corporate Centre	Servus Credit Union Ltd	11,700	2006	Financial Office	Office	51	1.90	224.2
Bell Tower	Solution 105 Consulting Ltd.	51,100	1982	Office	Office	NA	NA	NA
MNP Tower	Solution 105 Consulting Ltd.	39,000	1978	Office	Office	NA	NA	NA
9925 Building	Triovest Realty Advisors Inc.	21,100	1977	Office	Office	86	1.53	145.7
ATB Place	Triovest Realty Advisors Inc.	125,500	1971	Office	Office	70	1.66	161.8
ATCO Centre	Triovest Realty Advisors Inc.	31,600	1983	Office	Office	97	1.03	103.0
Telus World Of Science - Edmonton	Aenergy Capital	11,600	1984	Convention Center	Other	NA	NA	NA
Alberta Research Council Millwoods	Alberta Infrastructure	43,600	1980	Laboratory	Other	NA	4.86	406.4

Report Name	Registrant Organization	Gross Floor Area (m^2)	Year Built	Primary Property Type	Property Category	ENERGY STAR Score	2017 WN EUI (GJ/m^2)	GHG Emissions Intensity ($kg\ CO2e/m^2$)
Bonaventure Workshop	Alberta Infrastructure	3,200	1980	Other – Public Services	Other	NA	1.23	97.8
Central Vehicle Service Garage	Alberta Infrastructure	2,700	1980	Other – Public Services	Other	NA	1.40	111.0
Edmonton Remand Centre	Alberta Infrastructure	56,000	2012	Prison/Incarceration	Other	NA	2.71	259.8
Infrastructure Building (Shops)	Alberta Infrastructure	8,400	1980	Other – Public Services	Other	NA	1.31	94.5
Intoxication Recovery Centre	Alberta Infrastructure	2,000	1980	Outpatient Rehabilitation/ Physical Therapy	Other	NA	3.52	333.6
Law Courts Edmonton	Alberta Infrastructure	72,900	1980	Courthouse	Other	NA	1.75	172.2
Northern Alberta Jubilee Auditorium	Alberta Infrastructure	23,300	1980	Performing Arts	Other	NA	2.19	187.2
Single Mens Hostel Edmonton	Alberta Infrastructure	4,600	1980	Residence Hall/ Dormitory	Other	NA	1.61	126.2
Young Offender Centre Edmonton	Alberta Infrastructure	12,900	1980	Prison/Incarceration	Other	NA	1.88	167.7
Animal Care and Control Centre	City of Edmonton	2,300	2010	Other – Public Services	Other	NA	1.54	195.7
Centennial Transit Vehicle Repair/Storage Garage	City of Edmonton	29,600	2010	Repair Services (Vehicle, Shoe, Locksmith, etc.)	Other	NA	3.36	253.7
Central Lions Seniors Recreation Centre	City of Edmonton	6,300	1966	Social/Meeting Hall	Other	NA	1.92	178.4
Commonwealth Recreation Centre + Commonwealth Stadium + Clarke Stadium	City of Edmonton	106,800	1978	Stadium (Open)	Other	NA	1.06	103.2
Davies Site Fleet Services Building	City of Edmonton	4,700	1980	Repair Services (Vehicle, Shoe, Locksmith, etc.)	Other	NA	3.36	267.4
Davies Site Richard Paterson Garage	City of Edmonton	8,300	1965	Repair Services (Vehicle, Shoe, Locksmith, etc.)	Other	NA	4.73	327.9
DL MacDonald LRT Garage	City of Edmonton	23,500	1983	Repair Services (Vehicle, Shoe, Locksmith, etc.)	Other	NA	3.26	341.2
Ellerslie Fleet Services	City of Edmonton	12,000	1999	Repair Services (Vehicle, Shoe, Locksmith, etc.)	Other	NA	3.72	279.9
Emergency Response Centre Station No 42	City of Edmonton	4,800	1977	Mixed Use Property	Other	NA	3.47	306.7
Engineering Services Building TS Materials Test Lab	City of Edmonton	3,900	2012	Laboratory	Other	NA	4.06	374.7
Ferrier Transit Garage	City of Edmonton	18,900	1974	Mixed Use Property	Other	NA	4.40	290.6
Fire Station No. 28 (Heritage Valley)	City of Edmonton	1,400	2015	Fire Station	Other	NA	1.65	139.6
Mill Woods Library	City of Edmonton	5,200	2014	Social/Meeting Hall	Other	NA	1.42	155.7
Muttart Conservatory	City of Edmonton	8,500	1976	Other – Recreation	Other	NA	4.70	293.4
Northeast Traffic Field Operations	City of Edmonton	7,900	2015	Repair Services (Vehicle, Shoe, Locksmith, etc.)	Other	NA	1.65	140.3

Report Name	Registrant Organization	Gross Floor Area (m^2)	Year Built	Primary Property Type	Property Category	ENERGY STAR Score	2017 WN EUI (GJ/m^2)	GHG Emissions Intensity ($kg\ CO2e/m^2$)
Police Station - Southeast	City of Edmonton	4,700	2007	Police Station	Other	NA	2.86	309.8
Police Station - Southwest-Windermere	City of Edmonton	9,300	2013	Police Station	Other	NA	1.72	169.1
Waste Management Research & Development	City of Edmonton	4,400	2003	Laboratory	Other	NA	3.05	226.9
Waste Services Equipment Storage & Maintenance Facility	City of Edmonton	2,200	2011	Repair Services (Vehicle, Shoe, Locksmith, etc.)	Other	NA	3.37	292.8
Waste Services Integrated Processing & Transfer Facility	City of Edmonton	21,900	2009	Other - Public Services	Other	NA	2.61	265.9
Westwood Transit Garage	City of Edmonton	25,300	1961	Mixed Use Property	Other	NA	3.35	250.7
Kennedale Facility	EPCOR Utilities Inc.	8,800	1994	Repair Services (Vehicle, Shoe, Locksmith, etc.)	Other	NA	NA	NA
Best Western Plus South Edmonton Inn & Suites	Equitable Holdings LTD.	6,000	2009	Hotel	Other	NA	NA	NA
Fairfield Inn & Suites By Marriott Edmonton North	Equitable Holdings LTD.	5,400	2016	Hotel	Other	NA	NA	NA
HI-Edmonton	Hostelling International-Canada-Pacific Mountain	1,900	1960	Other - Lodging/ Residential	Other	NA	2.00	136.5
City Centre Campus (Complex)	MacEwan University	75,300	1993	Mixed Use Property	Other	NA	2.54	246.6
Robbins Health Learning Centre	MacEwan University	24,800	2008	Mixed Use Property	Other	NA	1.57	149.7
University Service Centre	MacEwan University	6,800	2011	Parking	Other	NA	2.21	233.4
Micralyne Inc	Micralyne Inc.	5,100	1998	Manufacturing/ Industrial Plant	Other	NA	NA	NA
Edmonton City Centre East	Oxford Properties	135,600	1974	Mixed Use Property	Other	NA	NA	NA
Lynnwood Centre	Humford Management Inc	3,700	1959	Strip Mall	Retail	NA	2.38	217.0
Southgate Centre	Southgate Centre / Ivanhoe Cambridge	106,700	1970	Enclosed Mall	Retail	NA	1.96	226.7
Infrastructure Warehouse No. 3	Alberta Infrastructure	2,200	1980	Non-Refrigerated Warehouse	Warehouse	NA	1.16	76.9
Ambleside ECO Station	City of Edmonton	2,400	2009	Non-Refrigerated Warehouse	Warehouse	NA	4.90	358.2
Kennedale Eco Station	City of Edmonton	2,200	2014	Non-Refrigerated Warehouse	Warehouse	NA	2.11	170.1
Northwest TS Yd Equipment Shop	City of Edmonton	2,700	1991	Non-Refrigerated Warehouse	Warehouse	NA	5.09	386.7
Southwest Transit Yard Equipment Storage Garage	City of Edmonton	4,200	2009	Non-Refrigerated Warehouse	Warehouse	NA	1.93	138.4
Distribution Centre	NAIT	6,900	1980	Distribution Center	Warehouse	NA	1.48	104.6

* *EUI data could not be weather-normalized*

APPENDIX B:
DATA QUALITY AND VERIFICATION

A data verification process was carried out to ensure the energy data submitted to the program did not contain any obvious errors or omissions. Records were examined for missing building information, non-Edmonton postal costs, missing electricity and/or natural gas consumption, and year of construction in 2017 or later. Inaccurate data was identified by examining buildings' energy use intensities (EUIs) and comparing to the range of expected values identified in external resources.

The US Department of Energy's Buildings Performance Database (BPD) was used to establish the expected ranges for overall building source EUIs.[21] The BPD was filtered for Climate Zone 7 buildings to match Edmonton's ASHRAE Climate Zone. Due to sample size limitations the BPD data was filtered by property type into Offices and Other buildings, for comparison to the City of Edmonton dataset. The following EUI limits were used to raise potential data quality flags, using the 25th and 75th percentiles for EUI from a recent BPD sample as a guide.

Building Type	Lower Source EUI Limit	Upper Source EUI Limit
Offices	0.75 GJ/m²	3.42 GJ/m²
Others	0.51 GJ/m²	4.90 GJ/m²

Buildings with unusually low or high electricity or gas consumption were also flagged as potential indicators of missing meter data, incorrect units for meter data, or under- or over-reporting of building floor area. The expected ranges for electricity and natural gas EUI (on a site basis) were:

Fuel Type	Lower Source EUI Limit	Upper Source EUI Limit
Electricity	0.15 GJ/m²	1.50 GJ/m²
Natural Gas	0.20 GJ/m²	3.00 GJ/m²

Participant buildings were prioritized for verification based on a judgement of the number and severity of the data flags raised. In the end, 14 properties were prioritized for data verification follow-up with the participants. Of the 14 flagged buildings, 11 were successfully revised and resubmitted through the Data Request link. Only three buildings were excluded from the analysis after confirming errors in the energy data that could not be resolved before the analysis and reporting activities concluded. In other words, more than 90% of all submitted properties passed the Data Verification stage without needing follow-up, and almost 80% of those flagged for follow-up were successfully revised.

21 Source EUIs were adjusted to reflect Canadian Source-Site factors

APPENDIX C:
YEAR 2 AWARD & RECOGNITION PROGRAM

ENERGY PERFORMANCE & LEADERSHIP AWARDS

In Spring 2019 the City of Edmonton hosted an awards luncheon to formally recognize all Year 2 participants. At this event the City presented the following performance and leadership awards to both the winner and runner-up participants in each of the following categories:

Winner	Runner-up
Highest Performing Office Category Based in participant ranking by ENERGY STAR Score	
Commerce South Office Park – Building B – Bentall Kennedy Canada (WN EUI = 1.02 GJ/m2)	ATCO Centre – Triovest Realty Advisors (WN EUI = 1.03 GJ/m2)
Highest Performing Other Category Based on comparison to the relevant National Median EUI for participants' property type	
Southgate Centre – Ivanhoe Cambridge (WN EUI = 1.96 GJ/m2)	Single Men's Hostel Edmonton – Alberta Infrastructure (WN EUI = 1.61 GJ/m2)
Leadership in Transparency Award Presented to non-government registrant organizations that submitted the greatest number of buildings consenting to building-level disclosure	
Northern Alberta Institute of Technology (NAIT) – 9 Buildings	Humford Management – 8 Buildings
Highest Performing Multi-Unit Residential Building Category Awarded to best MURB building with year-round occupancy, based on Weather-normalized Source EUI	
Riverwind – Riverwind Strata Title Housing Co-op (WN EUI = 1.08 GJ/m2)	Serenity – Serenity Condominium Corp.(WN EUI = 1.14 GJ/m2)
Best Overall Energy Performance Awarded to the participant with the lowest EUI among all Year 2 participants	
Student Residence Building – MacEwan University (WN EUI = 0.78 GJ/m2)	
Highest Performing Education Category Based on participant ranking by Weather-normalized Source EUI	
Winnifred Stewart School – Alberta Infrastructure (WN EUI = 1.05 GJ/m2)	Elves Special Needs Society – Aenergy Capital (WN EUI = 1.17 GJ/m2)
Best Year-Over-Year Improvement Based on ranking of improvement between Year 1 and Year 2 Weather-normalized e EUI	
Infrastructure Shops – Alberta Infrastructure – 21% YOY energy reduction	9925 Building – Triovest Realty Advisors – 19% YOY energy reduction

Leadership in Energy Transparency

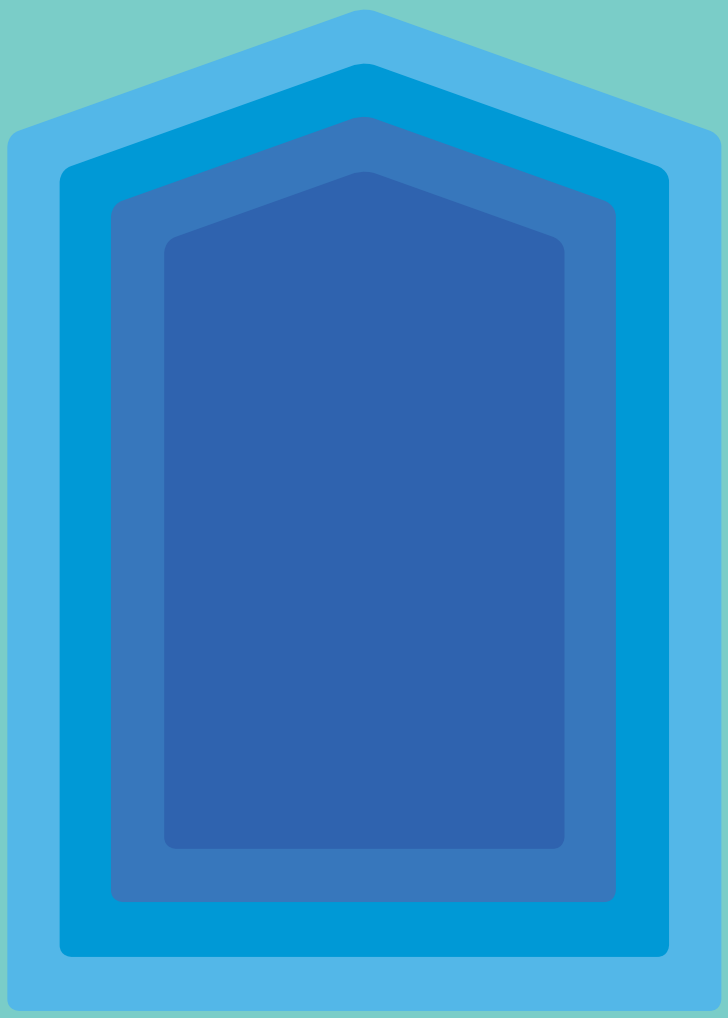
The following organizations consented to detailed disclosure, publicly sharing building-specific energy performance information. Their leadership in energy transparency is critical to our city's transition to a low carbon, sustainable energy future.

Commercial	MURB	Institutional
Bentall Kennedy (Canada) Limited Partnership	Aenergy Capital	Alberta Infrastructure
Hostelling International-Canada-Pacific Mountain	Boardwalk Rental Communities	MacEwan University
Humford Management Inc.	Go LED Now, Inc.	Northern Alberta Institute of Technology (NAIT)
Morguard Investments Limited	Go Net Zero, Inc.	NorQuest College
QuadReal Property Group	McLeod Condo Corp.	
Servus Credit Union Ltd.	Riverwind Strata Title Housing Cooperative Ltd.	
Ivanhoe Cambridge	Victoria Plaza	
Triovest Realty Advisors Inc.	Serenity Condominium Corp.	

Program Industry Advisors

The following individuals have contributed to the program's development as active members of Edmonton's Building Energy Benchmarking Industry Advisory Group. The City of Edmonton recognizes their invaluable contribution to the developments and accomplishments of the program.

Alvin Law	Alberta Urban Municipalities Association (AUMA)
Paul Soholt	Melcor Developments
Chris Vilcsak	Solution 105
Darcy Armstrong	QuadReal Property Group
David Conn & Jeremy Miles	ATCO
David Judge	Humford Management Inc
Dean Turgeon	3D Energy
Erik deJong	Riverwind East & West
Glen Scheuerman	Morguard
Christine Harkness	EPCOR
John Pietrasz	Oxford Properties
Kalen Pilkington	MacEwan University
Percy Woods	BOMA Edmonton
Robert Akkerman	NAIT
Sharmeen Moushumi	Government of Alberta
Sean Graham	Bentall Kennedy
Vivian Wagner	Ivanhoe Cambridge



Building Energy Benchmarking Program is a City of Edmonton initiative to support building owners and operators to reduce energy consumption.
For more information about this program, please visit: **edmonton.ca/energybenchmarking**

For more information, contact 311 or email **energystar@edmonton.ca**

CHANGE BUILDINGS FOR CLIMATE

Edmonton