

Part 5: Reporting and Insights

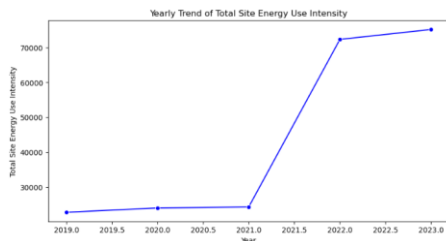
5.1 Summary Report

Report - Data Analysis of Building Energy

An overview of the dataset indicates a substantial variation in energy use among different property types. Specifically, gyms and heated swimming pools have the highest Site Energy Use Intensity (EUI), at 4.38 and 4.81 GJ/m², respectively. Energy consumption has broadly risen, as evidenced by an acute rise in overall greenhouse gas (GHG) emissions that soared from 24,310 metric tons in 2021 to 75,132 metric tons in 2023. The correlation (0.72) between property size and energy consumption, suggesting that larger properties naturally use more energy. High energy consumption in larger buildings.

Seasonal and Property Type Differences

Seasonal Variations in energy use:



From 2019 to 2021 have a small increase but from 2021 to 2022 sudden increase just from 30000 it went up to 70000 which indicates the usage increase and then it remained the same value from 2022 to 2023. The data need to be in monthly or quarterly figures to analyze the seasonal variations in energy use, we need more detailed data, such as monthly or quarterly figures. The yearly total is not useful to show variations across seasons, such as heating in winter or cooling in summer.

Property Type Variations:

The highest energy usage intensity (Site EUI in GJ/m²) is observed in:

Heated Swimming Pools (4.81 GJ/m²)

Fitness Centers/Gyms (4.38 GJ/m²)

Ice/Curling Rinks (2.18 GJ/m²)

Non-Refrigerated Warehouse, Mixed Use Property, Other have lower energy intensities.

Regex Use in Data Cleaning

Regular expressions (Regex) were utilized in data cleaning and extraction, mainly in:

- Standardizing numeric values: Extracting numerical data from textual numeric columns (e.g., "Property GFA - Self-Reported (m²)").
- Postal Code Formatting: Enforcing consistency by standardizing the Canadian format (A1A 1A1).
- Removing Unwanted Characters: Cleaning numerical data by removing commas and other non-numerical characters.

Supporting Visualizations

- Yearly Energy Use Intensity Trend: Exhibits a peak in 2022, emphasizing monitoring energy spikes.
- Top 10 Buildings by GHG Emissions: Selects properties which need urgent intervention.
- Heatmap of Energy Use by Property Types: Identifies high-energy properties, facilitating precise energy-saving strategies.
- Correlation Matrix Between Energy, Emissions, and Property Size: Shows the correlation between energy consumption and property size.

Recommendations

- Implement energy-saving technologies in high-consumption buildings.
- Encourage renewable energy adoption to reduce emissions.
- Develop property-type-specific energy efficiency programs.

GitHub Link:

<https://github.com/Megha-R-S/Data-Analysis-of-Building-Energy-Benchmarking-Data>