



Benchmark Montréal: analyzing building energy consumption

Energy Benchmarking — What is it?

Our team has been investigating building energy consumption across cities in North America generated through energy disclosure ordinances. An energy disclosure ordinance is a law that requires buildings of a certain size or type to track and report their annual energy consumption, also known as energy benchmarking. Using this data, we gained valuable insights about building energy performance across different property types, building sizes, and climate zones. The goal is to showcase what can be learned about building energy performance using this data with the hope that the City of Montreal can be inspired to start energy benchmarking.

What is new and distinctive about this project?

As shown in the map above, more than 30 energy disclosure ordinances exist in the U.S. while Canada has just one mandatory program in Ontario. Cities provide reports analyzing their annual energy consumption, but we wanted to use the lessons learned across multiple cities and regions to classify the performance of buildings in Montreal. We used the data from 7 cities in the U.S. and 28 cities and towns in Ontario to analyze the Energy Use Intensity (EUI) of buildings, which represents the energy use per floor area, allowing us to compare the energy performance of buildings of different sizes.

How does it work?

We first merged city energy data with regional census and climatic data to identify key attributes correlated with high and low EUIs as shown in Figure 1. We determined that the attributes most affecting EUI were climate-related, but Property Category (e.g. Healthcare, Residential) was also important as well as the source of energy for the building. We took this a step further by training a model to predict the EUI for large buildings in Montreal as Low, Medium, and High as shown in Figure 2, and presented these findings alongside other cities in North America.

Outcomes & Recommendations

Having access to this type of data in Montreal would allow researchers to engage with the City of Montreal to analyze energy consumption patterns and even strategize for future effects of climate change. We were able to identify specific buildings for which the EUI is more than 300% larger than the average for those cities, thus providing a more targeted approach to identifying candidates for potential retrofit or energy efficiency upgrades. Public availability of energy data can incentivize building owners to make changes and perhaps even inform investment decisions or spur action from building occupants.

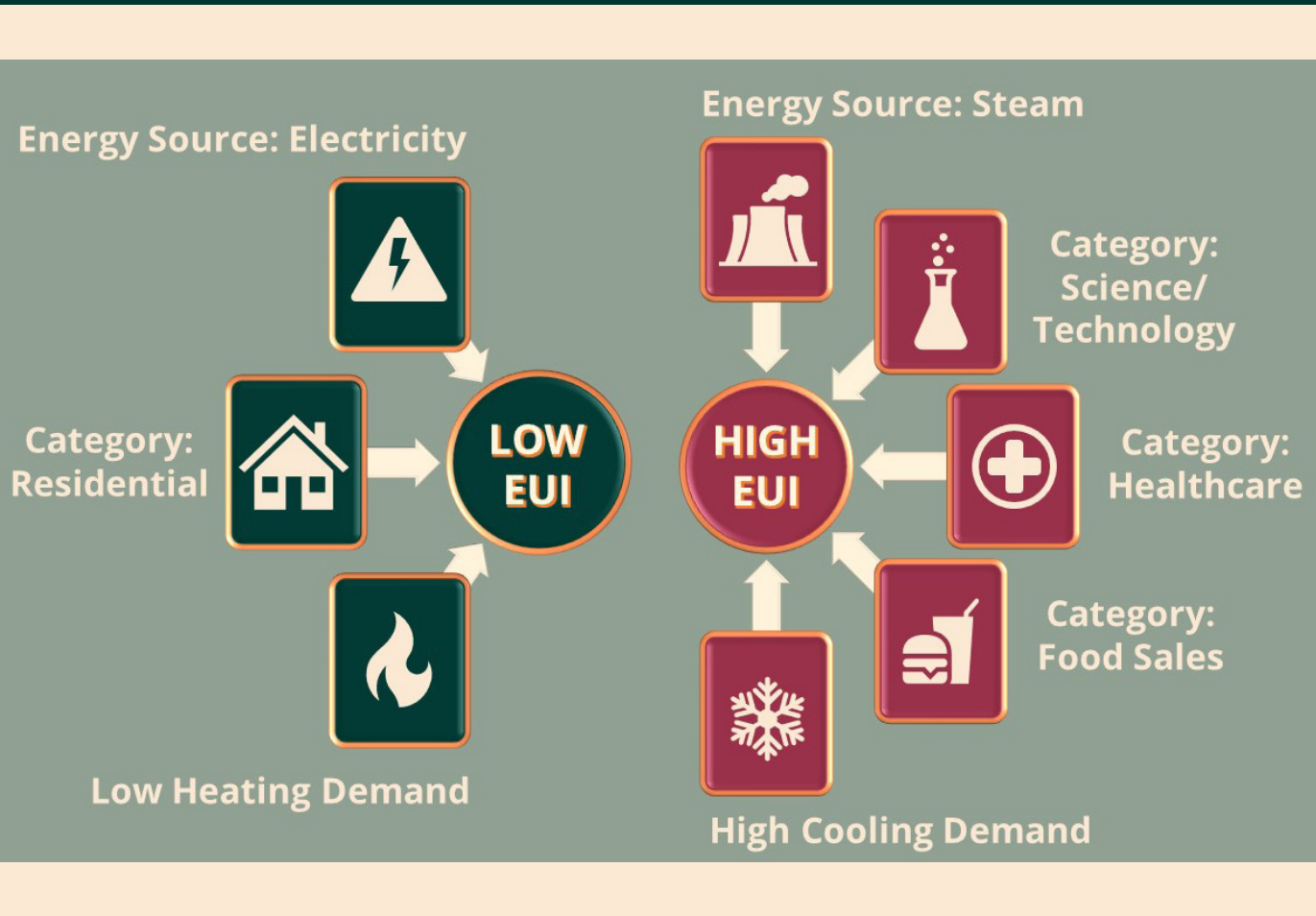


Figure 1. Factors correlated with high and low EUI
Note: This represents the key attributes when looking at all cities included in our study. Individual cities have different proportions of certain building types and energy sources, thus showing the importance of looking at the individual city level as well.

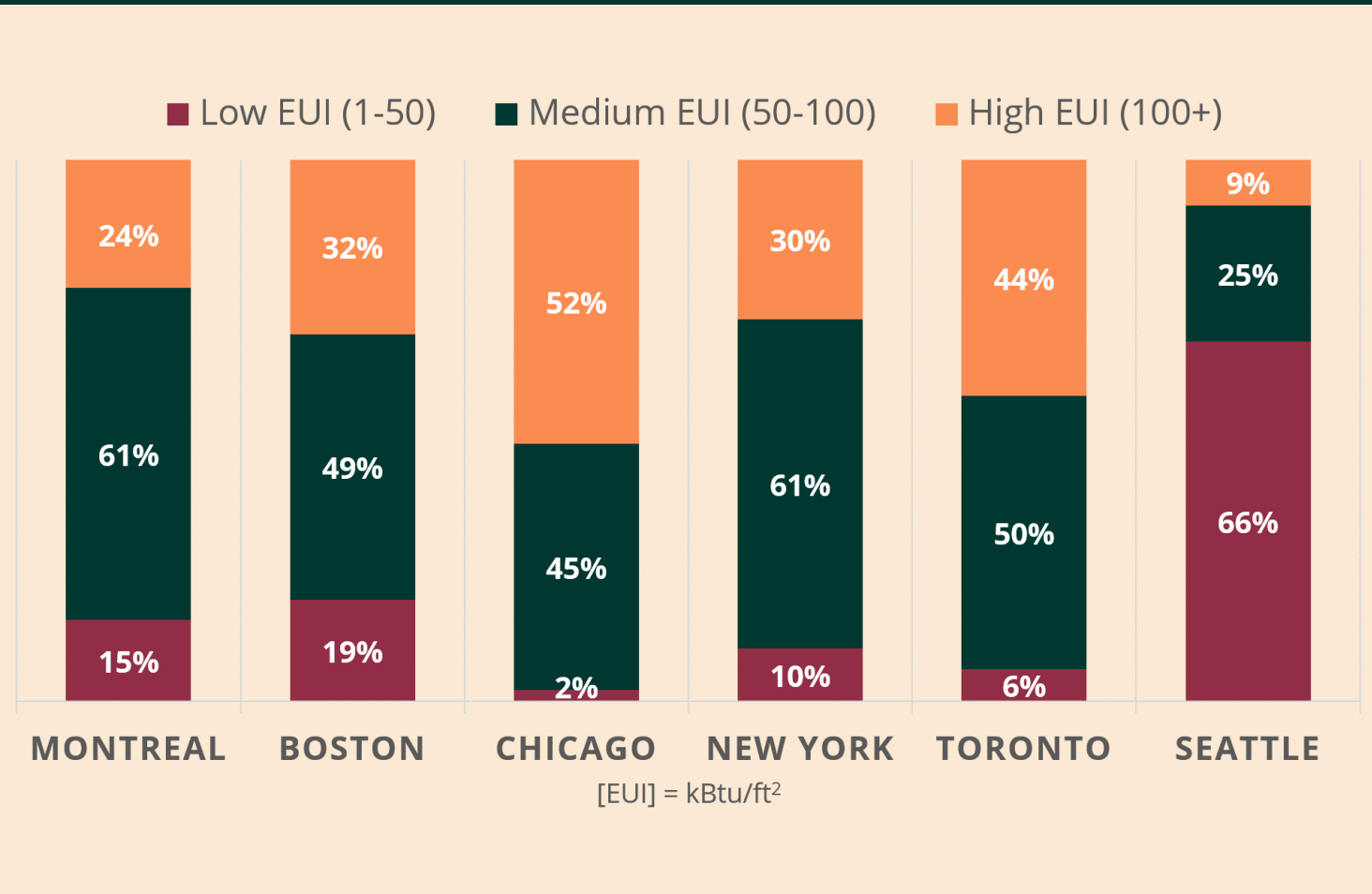


Figure 2. EUI classification for Montreal buildings over 50,000 ft²
Note: The buildings evaluated only represent those subjected to the disclosure ordinance (often large buildings over approximately 50,000 ft²) and thus do not necessarily represent the entire building stock of each city.



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