Energy Use Intensity (EUI) Conversion: GJ/m² to kWh

1. Introduction

Energy use intensity (EUI) is a measure used to evaluate the energy consumption of a building per unit of area. It is typically expressed in gigajoules per square meter (GJ/m^2) or kilowatt-hours per square meter (kWh/m^2) on a yearly basis. This document explains how to convert energy use intensity from GJ/m^2 to kWh and calculates the total, monthly, daily, and hourly energy use for a building.

2. Conversion Formula

To convert from GJ to kWh, the following relationship is used:

1 GJ = 277.78 kWh

Therefore, for a value given in GJ/m^2, the conversion to kWh/m^2 can be done as:

Energy (kWh/m^2) = Energy (GJ/m^2) × 277.78

3. Example Calculation

Let's consider a building with an energy use intensity of 2.58 GJ/m^2 for a year. To convert this to kWh:

2.58 GJ/m^2 × 277.78 kWh/GJ = 716.66 kWh/m^2

For a building with an area of 50 square meters, the total energy use per year is:

716.66 kWh/m^2 × 50 m^2 = 35,833 kWh/year

4. Monthly, Daily, and Hourly Breakdown

To determine the energy use on a monthly, daily, and hourly basis:

- Monthly energy use:
35,833 kWh/year ÷ 12 = 2,986.08 kWh/month

- Daily energy use:
35,833 kWh/year ÷ 365 = 98.21 kWh/day

- Hourly energy use:
98.21 kWh/day ÷ 24 = 4.09 kWh/hour

5. Reference for Energy Use Intensity

For a complete list of average energy use intensity by commercial and institutional building activity type, please refer to this link:

https://www150.statcan.gc.ca/n1/daily-quotidien/220805/t002c-eng.htm

6. Conclusion

In this example, the conversion of 2.58 GJ/m^2 results in a yearly total of 35,833 kWh for a 50-square-meter building. Understanding EUI in kWh allows for easier comparison across different types of energy consumption metrics and can help guide energy-saving decisions.