Master Energy Equation.
 This equation combines the Usage Baseline (what happens inside) with the Thermal Envelope (how the building interacts with the outside).

The Simplified Master Equation

C total

=

Usage Baseline

C total = (A total × EUI type) + ∑(A window × U window × ΔT)

Breakdown of the Variables (Based on your available data):

The Usage Baseline (Inside the building)

This part of the equation uses your Floor Area and Floor Numbers to estimate the energy needed for daily activities (lighting, computers, heating/cooling).

• A total

(Total Floor Area): This is the sum of all your floor areas. If you have a typical floor area and a floor number, your code would calculate A total=Area floor × Number of Floors.

• EUI type

(Energy Use Intensity): This is a constant "benchmark" based on the building type:

◦ Residential: 100 kWh/m^2/year

◦ Office: 180 kWh/m^2/year

◦ School: 150 kWh/m^2/year

The Envelope Impact (The Windows)

This part of the equation calculates how much energy is "wasted" or "gained" through your Window Sizes.

• A window

(Window Area): The total area of all windows extracted from your model.

• U window

(Transmittance): How fast heat passes through the glass. For example, standard windows in cool climates often have a limit of 1.8 to 3.2 W/m^2K.

• ΔT (Temperature Delta): The difference between the indoor setpoint (e.g., 21°C) and the average outdoor temperature of your climate zone.

How to use this in a Python script (The "Recipe"):

If you were to write this as a "recipe" for a computer, the logic would look like this:

Input: Total Floor Area, Floor Count, and total Window Area.

Logic (The "Steps"):

◦ Multiply Area by the Benchmark (e.g., 180 for an office).

◦ Multiply Window Area by the "Thermal Impact" (losses/gains).

◦ Sum them together to get the Annual Consumption (C annual).

Output: The total kWh the building will likely consume in a year.

Note: For professional LEED certification, this total C annual serves as the "denominator" to determine how much solar energy you need to produce to offset the building's footprint