What Is Building Performance Simulation?

Worksheet

Building performance simulation is computer modeling that predicts a building's energy, thermal, lighting and airflow behavior, most commonly summarized by Energy Use Intensity (EUI) = Total Annual Energy Use Floor Area.

Q = hA(@Delta T)

Questions

1. What does building performance simulation primarily predict?

A) Construction cost only
B) How a building will perform (energy, thermal, daylight, airflow) before it's built
C) The building's legal zoning status
D) Interior furniture layout

2. A building uses 300,000 kWh/yr over 3,000 m. What is its EUI?

A) 10 kWh/m/yr
B) 100 kWh/m/yr
C) 900,000 kWh/m/yr
D) 30 kWh/m/yr

3. What does a lower EUI generally indicate?

A) A less efficient building
B) A more energy-efficient building
C) A larger building
D) A higher construction cost

4. Which is NOT typically evaluated by building performance simulation?

A) Thermal comfort
B) Daylighting levels
C) Energy consumption
D) Stock market trends

5. An office building uses 500,000 kWh per year and has a gross floor area of 5,000 m. Find its EUI.

6. A school consumes 180,000 kWh/yr across 3,000 m. Find EUI and compare to a 120 kWh/m/yr benchmark.

7. A simulation shows a redesigned facade would cut annual energy use from 400,000 kWh to 320,000 kWh in a 4,000 m building. Find the new EUI and % savings.

8. Define: What is building performance simulation?

9. Define: What does EUI stand for?

10. Define: Name two things BPS software can predict.

Answer Key

1. B) How a building will perform (energy, thermal, daylight, airflow) before it's built - BPS models predict real-world performance metrics like energy and comfort before construction.

2. B) 100 kWh/m/yr - EUI = E/A = 300,000/3,000 = 100 kWh/m/yr.

3. B) A more energy-efficient building - Lower EUI means less energy consumed per square meter - greater efficiency.

4. D) Stock market trends - BPS covers physical building performance - not financial markets.

5. EUI = E / A EUI = 500,000 / 5,000 EUI = 100 kWh/m/yr

6. EUI = 180,000 / 3,000 = 60 kWh/m/yr 60 < 120 benchmark the school performs better than the benchmark

7. Old EUI = 400,000/4,000 = 100 kWh/m/yr New EUI = 320,000/4,000 = 80 kWh/m/yr Savings = (100-80)/100 = 20% reduction

8. Computer modeling that predicts a building's energy, thermal, lighting, and airflow behavior before construction.

9. Energy Use Intensity - annual energy consumption per unit of floor area (kWh/m/yr).

10. Energy consumption and thermal comfort (also daylighting, airflow/CFD, and acoustics).