What is Renewable Energy Integration?

Worksheet

Renewable energy integration means embedding solar, wind, geothermal or other clean-energy systems directly into a building's structure, orientation and systems so the building produces and manages much of its own energy.

Questions

1. Which design step should happen before selecting renewable energy equipment?

A) Passive design and orientation
B) Choosing furniture
C) Painting the facade
D) Installing carpets

2. What does a solar photovoltaic (PV) system do?

A) Heats water directly
B) Converts sunlight into electricity
C) Cools air using geothermal heat
D) Filters rainwater

3. What is the purpose of battery storage in a renewable-integrated building?

A) To increase roof weight
B) To store excess energy for later use
C) To replace insulation
D) To generate more sunlight

4. A geothermal heat pump with COP 3.5 uses 2 kW of electricity. How much heat does it deliver?

A) 3.5 kW
B) 2 kW
C) 7 kW
D) 5.5 kW

5. A 150 m roof gets 15 solar panels rated at 400 W each. What is the system's total capacity?

6. A house uses 900 kWh per month. Its 6 kW solar array produces about 800 kWh per month. How much of its demand is covered?

7. A geothermal heat pump has a coefficient of performance (COP) of 4. For every 1 kW of electricity it uses, how much heating output does it deliver?

8. Define: What is renewable energy integration in architecture?

9. Define: What should come before adding renewable equipment?

10. Define: Name three renewable systems used in buildings.

Answer Key

1. A) Passive design and orientation - Passive strategies reduce energy demand first, making renewable systems smaller and cheaper.

2. B) Converts sunlight into electricity - PV panels convert sunlight directly into electrical current.

3. B) To store excess energy for later use - Batteries store surplus renewable energy for use when generation is low.

4. C) 7 kW - Output = COP input = 3.5 2 = 7 kW.

5. Capacity = number of panels wattage 15 400 W = 6,000 W = 6 kW A 6 kW system can offset a large share of a typical home's annual electricity use.

6. Coverage = produced used 100 800 900 100 = 88.9% About 89% of monthly demand is met by solar; the rest comes from the grid or storage.

7. Output = COP input 4 1 kW = 4 kW of heating The building gets 4 kW of heat for every 1 kW of electricity purchased.

8. Designing a building's form, orientation and systems to generate and use clean energy such as solar, wind or geothermal power.

9. Passive design - orientation, daylighting, insulation and shading - to reduce demand first.

10. Solar photovoltaic (PV), solar thermal, and geothermal heat pumps (also wind in some sites).