

High-Performance Buildings

Opening Activity: Pair Discussion

Does it require more energy to cool a building in summer or heat a building in winter? Notes:

The Big Question

How can we use different materials, designs, and processes to ensure that new buildings are part of our climate solutions?

My Climate Goals

When you complete this lesson, you'll be able to

1. Explain the importance of energy-efficient building design, construction, and materials and their role in fighting climate change
2. Identify examples of climate-critical professionals designing and implementing solutions for new buildings to contribute to our net-zero goals
3. Describe some characteristics of LEED-certified and Passive House buildings and how they differ from most current buildings.

Notes:

Designing for the Climate

Instructions

Read the specific details for your assigned climate below. Then, follow the prompts on the next page to design your energy-efficient building.

Climates

Cold Climate

Key challenges:

- Extremely low temperatures with large amounts of snow and ice.
- High energy demands for heating.
- Long winters with short days with fewer hours of sunlight for much of the year.

Desert Climate

Key challenges:

- High daytime temperatures and cold nights.
- Little rainfall requires ways to collect and conserve water.
- Intense sunlight and low humidity.

Tropical Climate

Key challenges:

- High humidity and warm temperatures year-round.
- Heavy rainfall may require sloped roofs or a drainage system.
- The risk of mold, mildew, and overheating requires good ventilation.

Coastal Climate

Key challenges:

- High winds, saltwater exposure, and occasional hurricanes and storms.
- Humidity and flooding risk requires waterproofing.
- The risk of flood damage may require an elevated foundation.

Design Prompts

Use the prompts below to design your energy-efficient, high-performance building for the assigned climate.

What is your assigned climate?

What materials will you use?

What three energy-saving features will your building include?

How will each help make your building high performance and energy efficient?

Sketch your design for the building below:



Lesson Key Points

- High-performance buildings are designed to use less energy, improve comfort, and reduce environmental impact.
- Key features include energy efficiency, renewable energy integration, and smart technologies.
- Equitable design ensures benefits for all communities, including disadvantaged ones.

Additional key points:

Closing Activity

If you had time, what additional energy-saving element would you add to your green building design?

What role can you see yourself playing in creating energy-efficient buildings?

What careers of interest did you learn about in this lesson?