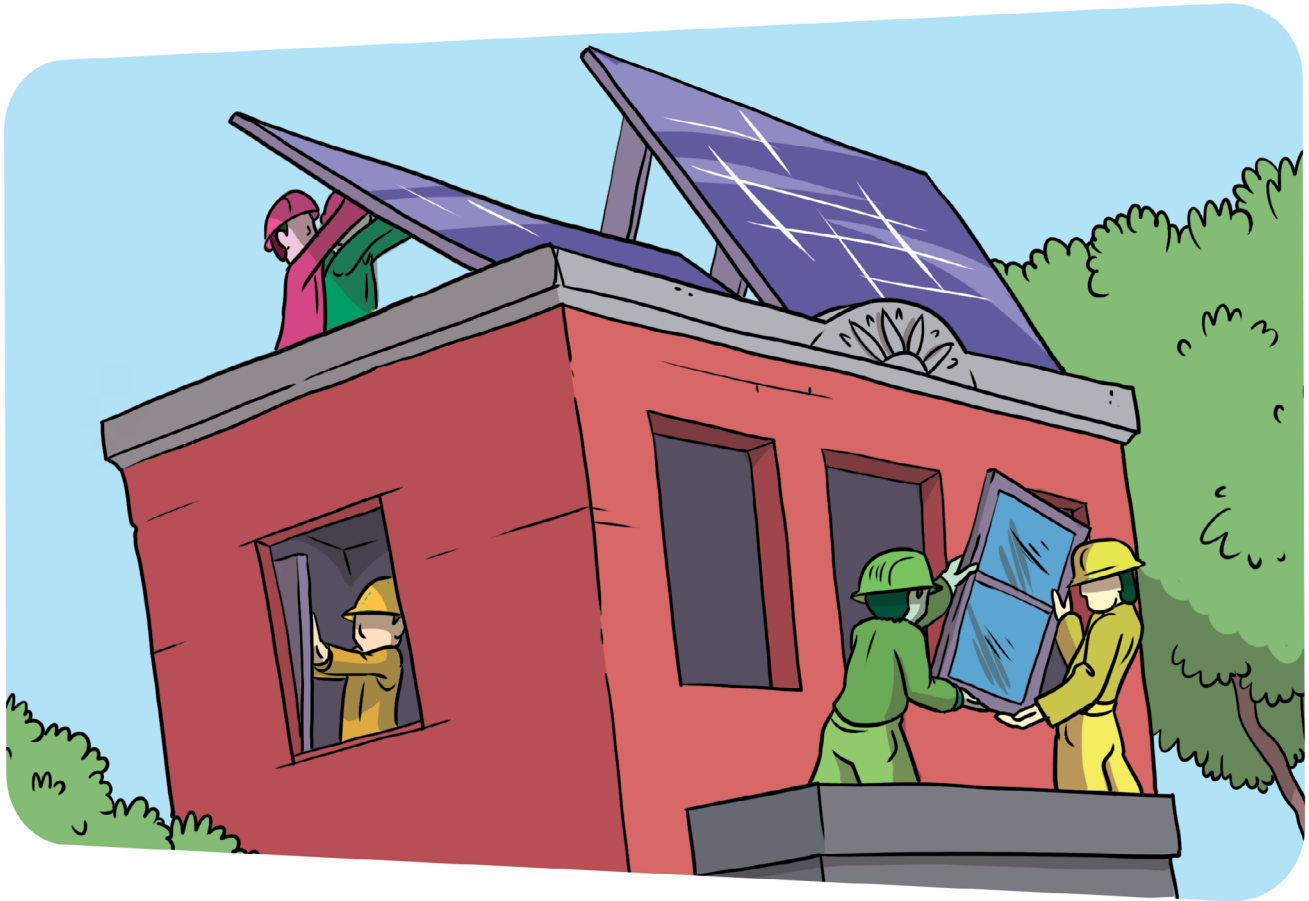




BUILD GREEN



How can we create better cities without talking about buildings? Take a look around you—where are you right now? From houses to skyscrapers, buildings are our homes, schools, offices, grocery stores, museums and hospitals; they are one of the very important ways we organize our cities. New ideas in design and technology have allowed us to build in ways that are less harmful to the environment, so we can support both our citizens and our planet as our cities grow. Put on your hardhats, and get ready to learn more about how we can construct greener, smarter buildings!



Unit 3 Vocabulary



ARCHITECTURE (noun)

The style or design of a building. *Example: Ancient Greek architecture is characterized by tall stone columns, such as those that hold up the famous Parthenon.*

CONSERVE (verb)

To help prevent something from being lost, wasted, or destroyed. *Example: It is important to conserve fresh water because the earth's supply is limited.*

FOSSIL FUELS (noun)

Natural sources of energy such as petroleum, coal, or natural gas that form within the earth from ancient animal and plant remains. *Example: The burning of fossil fuels is one of the main causes of climate change.*

HYDROPOWER (noun)

Power produced by running or falling water, which may be used to produce electricity. *Example: The city built a water turbine in the nearby river to create electrical power for the school building.*

ICONIC (adjective)

Widely recognized; representative of something important. *Example: The Eiffel Tower is an iconic symbol of Paris, France.*

INNOVATIVE (adjective)

Original, creative; introducing new ideas or methods. *Example: City planners develop innovative ideas to improve urban life, such as creating green spaces and pedestrian pathways in the middle of busy streets.*

NON-RENEWABLE ENERGY (noun)

Energy from a source that can run out or that takes a long time for the earth to produce, such as oil and coal. *Example: Coal is a non-renewable energy source because it takes billions of years for the earth to produce.*

RENEWABLE ENERGY (noun)

Energy from a source that cannot be used up or run out, such as energy from wind or water. *Example: Renewable energy technology, such as solar panels that produce energy from sunlight, is becoming more popular and cost effective.*

WIND TURBINE (noun)

A device that harnesses the power of the wind and turns it into energy. *Example: The city's location on top of a windy mountain allowed it to use a wind turbine to power its street lights.*



VOCABULARY CHALLENGE!

Create a short skit to act out the meaning of each of the vocabulary words. See if your classmates can guess which word you are acting out!

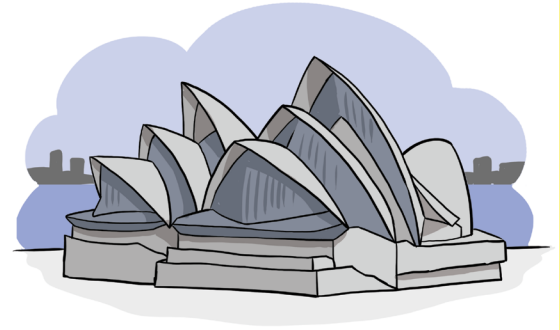


1 Iconic City Buildings

When you think of your city's skyline, which buildings stand out in your mind? Is there one that is exceptionally tall, a unique shape, or thousands of years old? Which would you choose to represent your city? Select one famous building in your city and conduct research to learn more about what makes it unique.

Use the space below to draft a post for the **Iconic City Buildings** discussion. Attach a photograph of the building to your post. Don't forget to include a trivia question for your peers to answer!

After you post, read and reply to posts from your international peers to learn more about iconic buildings in their cities, and conduct research to answer their trivia questions.



The building in my city I chose to research is: _____

I think this building represents my city because:

This building was built in the year: _____

Inside this building you will find:

In the past this building was used for:

Other interesting facts you should know about this building:

Trivia Question!

Write one trivia question about this building for your international peers to answer.



2 Sustainable Building Features

Look around—is the building you are sitting in sustainable? Sustainable building features are things that we add, change, remove, or improve to reduce our buildings' environmental impact.

These features are important because buildings have a huge environmental impact. For example, homes and commercial buildings consume more than 70% of all electricity used in the United States, and contribute to almost 40% of the nation's carbon dioxide emissions (*U.S. Department of Energy, 2015*).

Visit the **Sustainable Building Features** page in the e-classroom to watch a video about sustainable engineering, and read about additional features below!

Energy-efficient light bulbs such as halogen incandescents, compact fluorescent lamps (CFLs), and light emitting diodes (LEDs) use about 25%-80% less energy than traditional light bulbs, and can last 3-25 times longer. (*U.S. Department of Energy, 2015*)



Utilizing renewable energy sources such as sunlight or water can reduce your carbon footprint, helping to prevent climate change. For example, solar panels can be installed on rooftops to convert sunlight into energy that can help power homes and buildings.

You can reduce the need to turn up the heat or air conditioning by making sure your windows are airtight. Sealing cracks helps keep heat or air conditioning inside. Installing window shades can help let sunlight in or keep it out to naturally cool or heat a room.





Research

Select three sustainable building features that you want to know more about, and conduct research to learn how they work and why they are environmentally friendly. Examples include hydropower, cool roofs, low-flow toilets, motion sensing lights, and many more! Record your findings below.

Building Feature	Description	Source of Information



Share a proposal

Which of the sustainable building features above would you like to see used in your school? Share your proposal in the **Sustainable Building Features** discussion.

One sustainable feature we would like to see at our school is: _____.

This would help our school become more sustainable because:



3 Sustainable Building Tour

Take a tour of your school or another local building such as a library or community center. The goal of this tour is to observe and record features that may be helpful or harmful to the environment. Use the chart below to take notes.

Be sure to record photographs or video during your tour—you will need them to create an exciting and informative virtual tour of this building for your unit project!

Background information

Before your tour, take a moment to learn more about this building. When was it built, and for what purpose? How is it used today, and why is important to your city? Record your thoughts below.

Building observations

Take notes, photographs, and videos to record what you notice about the following parts of the building. Use the questions below to guide your observations and consider why each feature is sustainable or how it can be improved.

Feature	Description
<p>Exterior/construction materials What is the building made of—brick, wood, concrete? What can you observe from the outside that lets you know how the building is used?</p>	
<p>Location/surrounding area Is there green space around the building? Is there shade to help cool it in hot weather, or sunlight to reduce the amount of electrical light needed?</p>	
<p>Windows Are windows tightly sealed to keep heat or air conditioning in? Are there shades or blinds to let sunlight in or keep it out to naturally cool or heat the building?</p>	



Feature	Description
Rooftops How is the rooftop of this building used? Is there a rooftop garden or solar panels? What color is it? (Light colored, reflective roofs absorb less energy, keeping buildings cool.)	
Heating and cooling systems How is the building heated and cooled? Is the temperature controlled by people, or automatically (the system adjusts based on the temperature of the room)?	
Water use Where does the water for this building come from? Are there features in place to help conserve water, such as rainwater collection, low-flow toilets, automatic sinks, etc.?	
Lighting How is the building lit? Are the lightbulbs incandescent, compact fluorescent (CFL), or LED? Are lights controlled manually, or are they controlled by timers or motion sensors?	
Power sources Does the building get all of its power from the city's electrical grid, or does it use power from solar panels, wind turbines, hydropower or other more sustainable sources?	
Garbage disposal and recycling systems How is waste disposed of? Is there a recycling system? A composting system? How is litter in the building and surrounding area disposed of?	
<hr/> <p>(other)</p>	



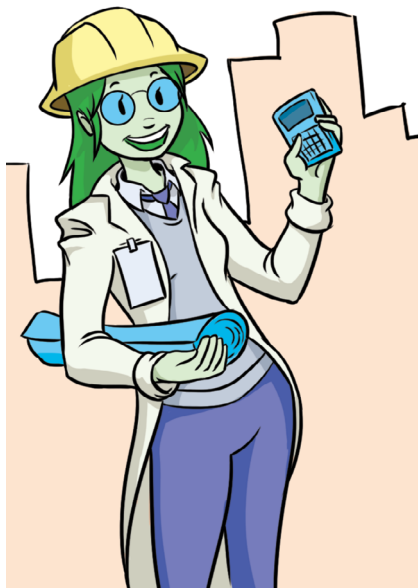
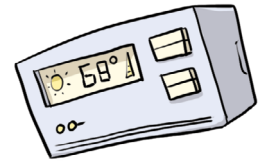
Challenge: Scavenger Hunt

See how many of the following sustainable building features you can check off on your tour! Take pictures of the features you spot to include in your project.

- energy-saving lightbulbs
- renewable energy source
(for example, solar panels, wind turbine)
- low-flow toilets
- airtight windows
- window blinds
- self-regulating thermostats
(heat or air conditioning turns on or off automatically depending on the temperature in the room)



- recycling system
- composting system
- air hand dryers
- automatic faucets
- motion activated lights
- rooftop garden
- rain harvesting system



Career Spotlight: Civil Engineer

Civil engineering is one of the oldest kinds of engineering in existence. A civil engineer designs and supervises the construction of major city projects such as roads, bridges, dams, and airports. Civil engineering is a broad field—a civil engineer could work on anything from the design of a skyscraper to the construction of a city’s sanitation and water systems. No matter what the project, civil engineers are responsible for some of the most important elements of our cities!



4 Unit 3 Project: Virtual Building Tour

During this unit, you learned about the significant impact that buildings have on the environment and researched innovative strategies that architects, engineers, and designers are using to make buildings greener and smarter.

All of the buildings we enter each day include some features that are already sustainable, and others that can be improved. You noted some of these during your building tour—now it's time to share your observations with the world!

For your Unit 3 project, you will create a virtual tour of the building you observed, highlighting both environmentally friendly features and ideas for how to make this building more sustainable.



Step 1: Reflect on your observations

Look back at your notes, photographs, and videos from the tour. Use the templates below and on the following page to guide your reflection. Compare observations with your classmates to determine which features you will highlight in your virtual tour.

Sustainable building features we observed:

1. _____
2. _____
3. _____

Ideas for improving this building to make it more sustainable:

1. _____
2. _____
3. _____



One thing that surprised me when exploring this building:

One question I have after exploring this building:

A resource I can use to answer this question is:





Step 2: Choose your digital media

Buildings in different cities vary greatly, so it's important to provide as much detail as possible when sharing your building tour with your international peers. Visuals such as pictures and videos can help others see what you observed. How can you present your building tour in a way that is both informative and exciting? Ask your teacher for ideas!

We chose to use _____ to share our building tour because:
(digital media)

My job for this project is: _____

Possible jobs for this project include:

- Researcher
- Technology Director
- Designer
- Writer
- Project Manager
- Or create your own job!

Step 3: Create your virtual tour

No matter which digital media tool you chose, all projects need to include the following:

- The name and location of your building
- Background information about the building, including the year it was built, what it is used for, and why your class chose to explore it
- At least three different building features that are environmentally sustainable
- At least three specific suggestions for improvement
- Your reflections on the experience of touring this building



Step 4: Share your work

When your virtual tour is complete, post it in the e-classroom in the **Unit 3 Project: Virtual Building Tour** discussion. Include a short written introduction to your building and digital project.



Step 5: Give your international peers feedback!

View virtual tours created by students in other cities, and see what sustainable features and ideas for improvement they shared. Choose two projects you find particularly interesting and write a response to give feedback.

Hello _____,
(student's name)

One thing I really liked about your virtual building tour was:

One similarity between your building and the one my class observed was:

Hello _____,
(student's name)

One thing I really liked about your virtual tour was:

One similarity between your building and the one my class observed was: