



# Future Home Design

Grade Level: 4-8  
Length: 60-75 Minutes  
[www.pwsrcac.org/lessons](http://www.pwsrcac.org/lessons)

## NGSS Standards

**3-5-ETS1-2** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

**5-ESS3-1** Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

## Crosscutting Concepts

**Structure and Function** The way an object is shaped or structured determines many of its properties and functions.

**Systems and System Models** A system is an organized group of related objects or components. Models can be used for understanding and predicting the behavior of systems.

## Overview

There are many innovative ways to design a building that needs less energy, generates less waste, and supports a healthy way of life.

## Objectives

- Students will identify ways to conserve energy and minimize waste.
- Students will design their ideal green home.

## Materials

- Pencils
- Pens
- Colored Pencils
- Drafting Paper or Other Large Sheets of Paper
- Scratch Paper
- Rulers
- Computers with Internet Access
- Whiteboard or Posterboard
- Dry Erase Markers or Colored Markers

## Background

In this activity, students design a home for themselves in the future. This builds on their knowledge of energy conservation and efficiency, but also pushes students to create innovative solutions to problems of energy & resource use, waste, and health.

## Notes

## Preparation

If possible, arrange a field trip to visit a local building or home with features that promote some type of energy conservation, waste mitigation, or clean water and air. Your school might incorporate some of these features. Otherwise check out a building with solar panels, living roof, or recycled or renewable insulation (straw bale houses are a great example!)

If you cannot arrange a field trip, use a virtual field trip option such as The Living Building Challenge –Kendeda:

<https://livingbuilding.gatech.edu/>

The Sustainable House:

[http://www.livegreenlivesmartbuilders.com/sustainable\\_tour2.html](http://www.livegreenlivesmartbuilders.com/sustainable_tour2.html)

UMBC Green Buildings: [https://umbc-  
ges.maps.arcgis.com/apps/MapJournal/index.html?appid=c26c6bdc62  
5941ac9e2581b0c7ea8486](https://umbc-ges.maps.arcgis.com/apps/MapJournal/index.html?appid=c26c6bdc625941ac9e2581b0c7ea8486)

Interesting videos are also available through the Cold Climate Housing Research Center, which you can share with your class:

<http://cchrc.org/>

## Introducing the Lesson

Ask each student to think about the most interesting feature they have ever seen or heard about on a home or building that made it less wasteful and more livable. Write all of these features on the board. As a class, organize these features into categories based on the challenges they address (energy conservation, building materials, water conservation, clean air, human health, etc.).

Explain to students that they are going to design their own future home. Their goal is to create a home they would be happy living in that incorporates innovative ways to conserve resources, minimize waste, and have a positive effect on the environment. Encourage students to think about what they have learned about energy conservation and also ways that a home can mimic an ecosystem, where all waste is recycled and reused. Provide students with some examples of green buildings, either through a live or virtual tour.

Before they begin, instruct each student to identify at least 2 criteria and 2 constraints that they will use to guide their design. Possible criteria and constraints include:

- Includes recycled or reused materials
- Carbon neutral electricity & heating/cooling

- Conservation and re-use of water
- Low cost materials
- Closed-loop system for waste

## Activity

1. Divide students into “design teams” of 2-3 and arrange so that they are sitting near each other. Each student will create their own design, but the team is set up to provide feedback.
2. Pass out drafting paper, scratch paper, pens, pencils, and colored pencils to each student. Have students begin by creating a quick sketch of their future home on the scratch paper, incorporating green building ideas that appeal to them.
3. After the first sketch is complete, students should meet with their design teams. Each student needs to present their preliminary plan and the criteria and constraints they used. Then their design team should give constructive criticism and feedback. If necessary, provide guidance to students on how this feedback should be delivered.
4. Then have students incorporate that feedback into a final design, which should be illustrated on the drafting paper. The green design features should be included in the drawing and explained in writing on the edge of the design.

## Wrap-up

Have each student present their green building design to the class. Have students share compliment sandwiches about the designs –one aspect they think is really strong, one aspect they think should be changed, and another aspect they think is really strong. Display the design plans where others can see them. Discuss the designs. Ask students how many of them would actually like to live in one of these homes. Why or why not? Ask students to identify the one feature they’d be most likely to incorporate into their home in the future. List these features on the board and discuss the effects (positive and negative) these features would have on the environment and human health.

## Assessment

Review student draft designs and final designs. Students who have successfully met the performance expectations will (1) create designs that show they have combined information from multiple sources about science ideas that can be incorporated into sustainable buildings and (2) demonstrate during discussions and through their design that they have generated a design solution, compared it to other design solutions, and refined their solution to better meet criteria and constraints. Look for evidence that students have changed their plans based on feedback they received during discussion with their design team.