

Lesson #9

The Home of the Future

Working in pairs or small groups, students become teams of architects determined to design an energy efficient home of the future. They consider ways that energy gets wasted at home, research energy saving solutions, and design and present their ideas. Students discover that there are a range of ways to save energy at home—from changes in our daily behaviour to the installation of energy efficient appliances to landscaping decisions.

Subject Areas

Social Studies, Language Arts,
Fine/Visual Arts

Student Skills

critical and creative thinking,
observation, presentation, oral
communication, and team work

Developing Vocabulary

design, architect, energy
conservation, energy efficient,
programmable thermostat,
insulation, double windows,
weather stripping

RELATED BACKGROUNDRS



Taking Action

Learning Objectives

- ◆ consider ways to reduce home energy use and the practical steps that can be taken every day
- ◆ work as a team to research energy saving solutions and then design a home of the future based on their ideas
- ◆ reflect on the feasibility of implementing energy saving solutions

Materials You Need

- ◆ note paper, cards or sticky notes (one per student)
- ◆ white poster board or chart paper for each group
- ◆ markers, crayons, rulers or other colouring and design tools
- ◆ computers with Internet access for one class period
- ◆ the EnerAction backgrounder, *Taking Action: Personal Choices About Energy Use*

“When people think of global warming, many of them probably think of factory smokestacks and cars. People don’t realize that buildings contribute 30 per cent of greenhouse gases.”

— Nancy Searchfield, Canada Green Building Council

Time Estimate

Lead In

Main Activity

Wrap Up

30 minutes

90 minutes

30 minutes

2.5
HOURS

What You Do

Lead In

30 minutes

Lead In

- Begin with a brief discussion about what it means to waste energy. Ask students if they ever waste energy — by leaving the lights on in their room or letting the water run while they brush their teeth. Ask for examples from a number of students:
 - ◆ Do you ever leave the room with the TV still on?
 - ◆ Do you ever ask for a ride when you could walk somewhere?
 - ◆ Is there a computer in your home that stays on all the time?
- Ask students to write down on a piece of paper one thing that they do every day that wastes energy. Collect, shuffle and redistribute the papers.
- Play charades. Individual students volunteer to act out what's on the paper you give them as the rest of the class tries to guess. A student might act out turning the TV on and then leaving the room, for example. Write each example on the board.
- After you have about six examples, ask students to identify potential solutions. Add their ideas to the board.

Waste	Solutions
Leaving the TV on	Don't turn it on, or turn it off whenever you leave the room.
Leaving the windows open when the air conditioning or heat is on	Shut the windows, or turn off the air conditioning.
Doing loads of laundry each day	Wear your clothes until they are dirty, not just wrinkled, and always wash clothes in cold water.
Leaving the light on	Turn the light off, and choose fluorescent bulbs.

- Review the list and challenge the class to use their imaginations to come up with creative and unusual design solutions. For example, could you install motion-activated lights that would turn off automatically when there is no one in a room? To avoid the need for air conditioning, could an architect design the house so that it is surrounded by shade trees that make the air cooler? Add a third column to the chart to make room for students' design ideas.

Waste	Simple Solutions	Design Solutions
Leaving the TV on	Turn the TV off when you leave the room.	Design a TV that is motion activated.
Leaving the window open if the air conditioning is on	Shut the windows, or turn off the air conditioning.	Install ceiling fans instead of air conditioning. Keep window coverings closed during the day to reduce sunlight in the house.
Doing loads of laundry each day	Wear your clothes until they are dirty, and always wash clothes in cold water.	Create a low-water washing machine that uses only cold water.

What You Do

Main Activity

90 minutes

Main Activity

6. With students working in pairs or small groups, tell them they are teams of architects who must design an energy efficient home of the future. While all students will contribute to the overall design, consider having students take on specialized roles:
Outdoor architect, responsible for the home's exterior:
 - ◆ What will the home be made from? How many windows will it have and where will they will be facing?
 - ◆ Where will you place plants and shade trees around the home?
 - ◆ Will you incorporate special features? Will the home be partially lowered into the earth or have a thatched roof, for example?
 - ◆ Will there be a garage? Where?Interior architect, responsible for the home's interior:
 - ◆ Will you choose fixtures that conserve water in the bathroom and kitchen? Will you have taps that turn off by themselves or special low flush toilets, for example?
 - ◆ What appliances will you choose for the kitchen and laundry room?
 - ◆ Will you have any special features in the living room and bedrooms? Will you have a solar-powered TV surround system or a heated floor, for example?
 - ◆ Will you allow for off-grid energy sourcing and use the wind, solar or geothermal energy that is locally available?
7. Tell the teams to brainstorm the overall design of the home. Once they have considered the location, dwelling type (single building, townhouse, condo), size and number of rooms, and landscaping, they can start to discuss specifics — such as energy saving appliances and devices.
8. Give students time to conduct some preliminary research:
 - ◆ http://www.ase.org/section/_audience/consumers/kids
 - ◆ http://www.sustainable.energy.sa.gov.au/pages/advisory/residential/house_design/
 - ◆ http://www.ase.org/section/_audience/consumers/kids
 - ◆ <http://www.energyhog.org>
 - ◆ the EnerAction backgrounder, *Taking Action: Personal Choices About Energy Use*
9. Encourage students to incorporate existing design solutions as well as their own ideas.
10. Ask student teams to present some of their initial findings. Ask them whether they are using existing solutions as well as their own solutions.

What You Do

Main Activity (continued)

- Hand out poster board to each group so that they can draw the home of the future. Encourage them to use pencils because their designs will undoubtedly change as they work. Each poster should include the following:
 - ◆ A sketch of the home's exterior.
 - ◆ A sketch of the main rooms — the bathroom, bedroom, kitchen, laundry room, livingroom — with energy saving appliances and devices clearly marked.
 - ◆ A title or name for the home.
- When student teams have completed their designs, ask each group to present their poster and plans. Following each presentation, allow time for questions and comments.

Wrap Up

30 minutes

Wrap Up

- Discuss students' responses to the various design ideas:
 - ◆ Which home of the future do you think would be the most energy efficient?
 - ◆ What makes some homes more efficient than others?
 - ◆ What energy saving solutions were incorporated into the homes?
 - ◆ Are there buildings that already exist that take advantage of some of these solutions?
 - ◆ How could your home be more energy efficient? What could you do to save energy at home? Encourage a wide range of answers: using the dishwasher only when it is full, turning off the computer when it's not in use, turning the thermostat down at night, improving insulation, weather stripping doors and windows.
- Hang the posters of the Homes of the Future in your classroom or a hallway so that they will be seen and appreciated.

Did You Know?

Drake Landing, a 52-unit suburban residential development in Okotoks, AB, is a model for sustainable suburban construction whose solar thermal panel topped garages trap 90 per cent of their heat needs. As Ron Stanner, President of the Calgary Real Estate Board says, "The demand for this kind of home is definitely growing. There are only a handful now, but that's set to change."

— from "Suburbia goes solar" by Patrick White, *Globe and Mail*, June 13, 2007

Adaptations & Extensions

- **Research one solution to take home.** Have students ask their families if they are aware of potential energy efficiency devices that they could be using in their homes. Have students research one or two particular items that are relevant to their families. For example, what is the most energy efficient fridge or freezer? How much energy would it save?
- **Research current technology and design innovations.** Have your students research specific innovations that are currently in use and then present them in dramatizations and/or posters and/or presentations. They could explore straw bale homes, rammed earth, cob homes, or geothermal or passive solar heating, for example. Visit <http://www.sustainablebuildingcentre.com> for more information. You could even incorporate a field trip to a local sustainable building centre or sustainable design home.
- **Discuss the 100-100-100 strategy.** Have students explore and discuss the new 100-100-100 building strategy to reduce global warming. Briefly, that strategy supports training 100 million people in green building, establishing 100 green building councils and raising the \$100 million needed to do so by 2010. For more information, visit <http://www.renx.ca/Detailed/1325.html>.
- **Host a school-wide Home of the Future contest.** If a number of classes do the Home of the Future lesson, each one could select what it considers to be its most energy efficient home and then enter it into the contest. Winning teams would present their designs to the teachers, and teachers would choose the most energy efficient home overall.
- **Host a Real Estate Fair.** Design teams become real estate agents trying to sell their home of the future based on its energy efficiency. Students from other classes tour the posters of the different energy efficient homes and learn from the realtors why they might like to live in each home of the future.

Assessment Rubric

These criteria can be expanded or adapted to emphasize different aspects of the lesson. You can use the rubric to help students self-assess their participation and experience, and then pose follow-up questions to the class encouraging them to reflect further on their challenges and insights.

Knowledge & Understanding	1	2	3	4
Identify features that improve the energy efficiency of buildings	Demonstrates limited understanding by providing minimal features	Demonstrates some understanding by providing a few features	Demonstrates considerable understanding by providing a variety of features	Demonstrates a thorough understanding by providing an extensive range of features
Thinking	1	2	3	4
Evaluate ways in which technological innovations increase or decrease our ability to conserve energy.	Demonstrates limited effective use of thinking skills by evaluating one or two examples	Demonstrates limited effective use of thinking skills by evaluating no more than three examples	Demonstrates effective use of thinking skills by evaluating no more than five examples	Demonstrates highly effective use of thinking skills by evaluating more than five examples
Application	1	2	3	4
Develop solutions to avoid wasting energy and resources both at home and at school	Limited effectiveness; makes some simple solutions	Some effectiveness; makes some simple, logical solutions	Considerable effectiveness; makes clear and logical solutions	Demonstrates highly effective ability by summarizing a wide variety of important ideas and citing more than five supporting details
Communicate orally in a clear, coherent manner, presenting ideas, opinions and information in a readily understandable form	Limited effectiveness; communicates in a simple and fairly understandable form	Some effectiveness; communicates with a few supporting details and new ideas	Considerable effectiveness; communicates with a variety of supporting details and ideas	High degree of effectiveness; communicates with a wide variety of supporting details