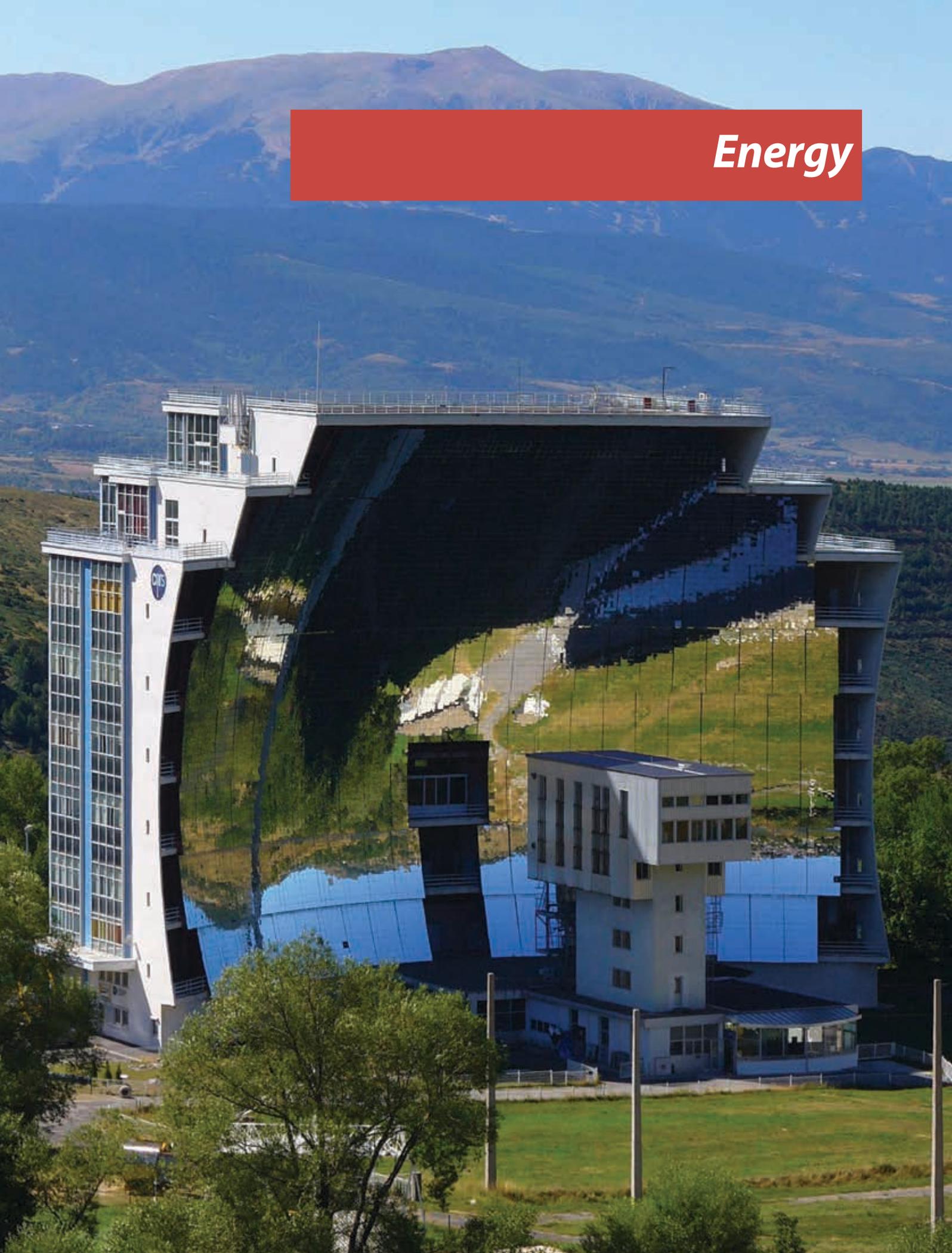
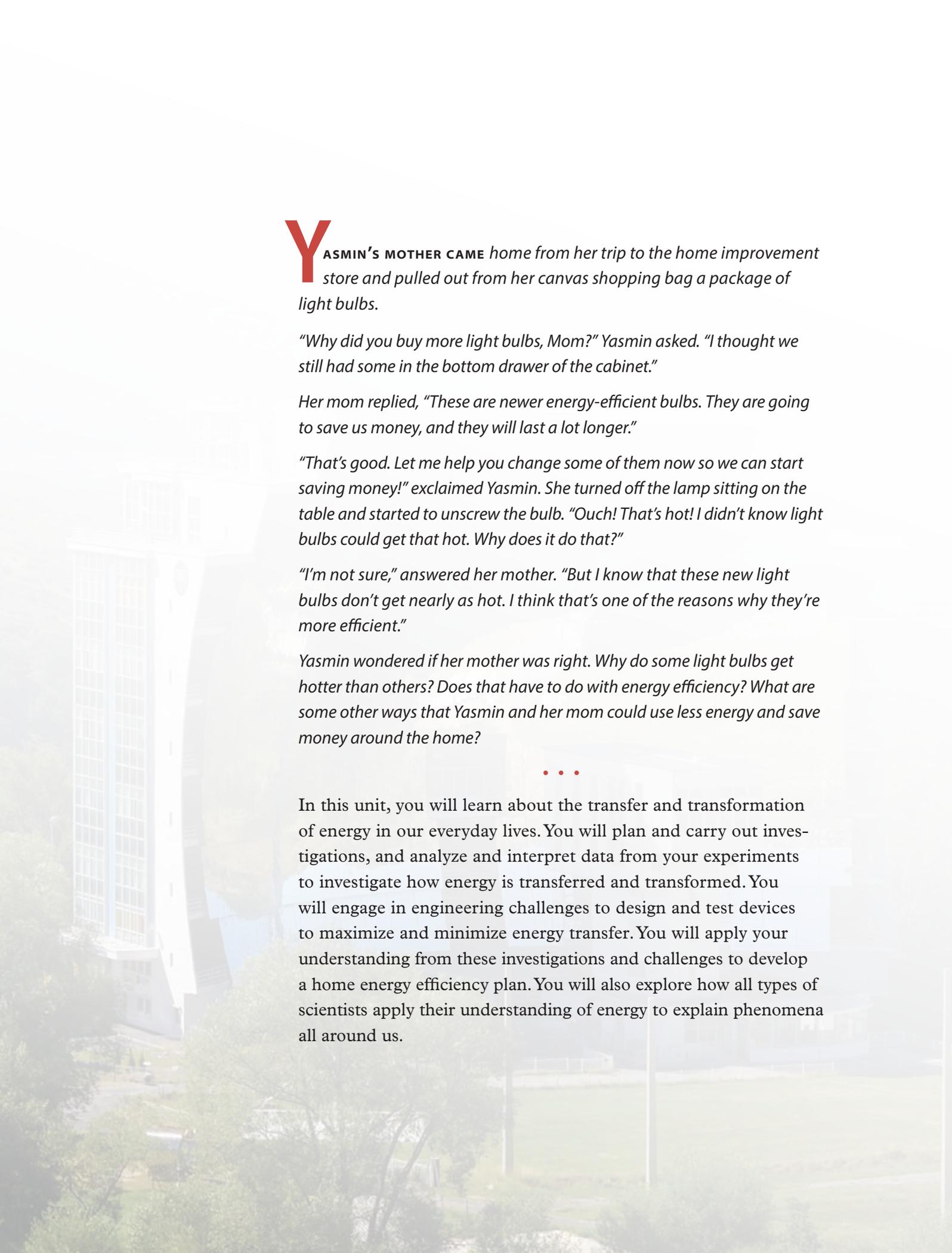


# *Energy*





**Y**ASMIN'S MOTHER CAME home from her trip to the home improvement store and pulled out from her canvas shopping bag a package of light bulbs.

*"Why did you buy more light bulbs, Mom?" Yasmin asked. "I thought we still had some in the bottom drawer of the cabinet."*

*Her mom replied, "These are newer energy-efficient bulbs. They are going to save us money, and they will last a lot longer."*

*"That's good. Let me help you change some of them now so we can start saving money!" exclaimed Yasmin. She turned off the lamp sitting on the table and started to unscrew the bulb. "Ouch! That's hot! I didn't know light bulbs could get that hot. Why does it do that?"*

*"I'm not sure," answered her mother. "But I know that these new light bulbs don't get nearly as hot. I think that's one of the reasons why they're more efficient."*

*Yasmin wondered if her mother was right. Why do some light bulbs get hotter than others? Does that have to do with energy efficiency? What are some other ways that Yasmin and her mom could use less energy and save money around the home?*

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In this unit, you will learn about the transfer and transformation of energy in our everyday lives. You will plan and carry out investigations, and analyze and interpret data from your experiments to investigate how energy is transferred and transformed. You will engage in engineering challenges to design and test devices to maximize and minimize energy transfer. You will apply your understanding from these investigations and challenges to develop a home energy efficiency plan. You will also explore how all types of scientists apply their understanding of energy to explain phenomena all around us.

# 1

## Home Energy Use

### INVESTIGATION

**Y**ASMIN AND HER mother examined the form that came with their new water heater. "Look," said Yasmin, "We can get a huge rebate!"

Her mother looked more carefully at the paper. "You're right! This water heater is more energy efficient than our old one, so we qualify for the rebate."

As Yasmin's mother sat down and started to fill out the form, Yasmin read over the accompanying flyer. Something caught her attention again. "Mom, did you know that there is a free service that will send someone here to tell us how to save even more energy?"

"Oh, that would be great," said Yasmin's mother. "Last winter we had a pretty high utility bill. I don't want to waste my hard-earned money if I don't have to."



Yasmin and her mother looking at the rebate form



**Comparing Energy Features in Two Similar Homes**

HOME FEATURE	HOME A, TEXAS	HOME B, NEW YORK
Heating source	Oil	Natural gas
Cooling source	Electricity	Electricity
Insulation	Ceiling	Exterior walls, ceiling
Window type	10 single pane	5 single pane, 3 double pane
Window treatment	Reflective film	No treatment
Hot water heater	Electric	Natural gas
Air conditioning	Central	1 high-efficiency window unit
Appliances	3 high efficiency, 3 not high efficiency	5 high efficiency
Light bulbs	10 incandescent, 4 compact fluorescent	3 incandescent, 8 compact fluorescent, 3 LED
Nearby vegetation	Grass	Tall shrubbery, maple trees

*Home A, Texas**Home B, New York*

5. Answer Analysis items 1–5 as directed by your teacher before continuing to the next step.
6. Use Student Sheet 1.2, “Developing a Home Energy Efficiency Plan,” to begin developing a home energy efficiency plan that you will present in the final activity in this unit.

## ANALYSIS

1. How do the climates, or average weather conditions, in the two home locations influence the energy use in the homes?
2. **Energy efficiency** means using less total energy to provide the same amount of useful energy. For example, a light bulb that uses less energy than another to provide the same amount of light is more energy efficient. Based on your experience in this activity, give two examples of changes that could make a home more energy efficient.
3. If the people who live in Homes A and B have similar lifestyles, which home do you think uses less energy in a year? Use your analysis and interpretation of the data in the table to support your choice.
4. What could be done to reduce the energy needs of
  - a. Home A?
  - b. Home B?
5. What are the trade-offs in making a home more energy efficient? A **trade-off** is a desirable outcome given up to gain another desirable outcome.
6. **Reflection:** What steps have you and your family taken to reduce energy use in your home?