

Technology for a Green Future



Technology for a Green Future

Student Objectives

I will be able to:

- Read and analyze informational texts and opinions.
- Share ideas with my peers.
- Build my vocabulary knowledge.
- Write a literary text, an informational essay, and an opinion piece.

Tips for Text Annotation

As you read closely for different purposes, remember to annotate the text. Use the symbols below. Add new symbols in the spaces provided.

Symbol	Purpose
<u>underline</u>	Identify a key detail.
★	Star an important idea in the margin.
① ② ③	Mark a sequence of events.
○magma○	Circle a key word or phrase.
?	Mark a question you have about information in the text. Write your question in the margin.
!	Indicate an idea in the text you find interesting. Comment on this idea in the margin.

Your annotations might look like this.

Notes	The Gold Rush
	16 The migration on the Oregon Trail became an annual event. Thousands of emigrants ^① began to join the wagon trains heading West. Then in ^②
	★ 1848, gold was discovered in California. The ^③ lure
That's a lot of people!	of rich farmlands now changed to fields of gold. [!] By 1850, more than fifty thousand people traveled the Oregon Trail West. <u>Instead of turning toward Oregon near the end of the trail, many turned</u>
Who was the first person to discover gold?	<u>to California.</u> They hoped to find their fortune mining or panning for gold instead of farming. [?]

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Technology for a Green Future

Essential Question

How do we make decisions about developing new technology?





Remember
to annotate
as you read.

Notes

The Hopeville Ledger Morning Edition

Town Tackles Energy Debate

by Francisco Blane

- 1 Last night, Hopeville’s Mayor Julia Sanchez held a town meeting with town residents to discuss plans for a new power plant. The plant would be built on unused farmland on the outskirts of the city. So far, no one agrees on what kind of energy to invest in.
- 2 “The federal government will give us \$200 million,” Sanchez said. “But that will only pay part of the cost. We will have to raise most of the money ourselves. The question is what kind of energy plant will we develop?” The mayor presented two alternatives: natural gas or solar power.



The Hopeville town meeting drew a crowd of concerned citizens.

Notes



Some power plants use solar panels to convert light to electricity.

- 3 A loud debate followed her remarks. Tom Bradshaw, a professor from Southwest University, said, “We must pursue solar power. Solar power is energy from the sun. It’s free and clean. We can’t continue to release greenhouse gases that cause the planet to overheat.” He showed the audience a report from the California Energy Commission. It said that one day of sunlight contains more than twice the energy people could use in one year.
- 4 Vicki Tomlin, a store owner, also argued for a solar-powered plant. “It would be good for Hopeville’s economy. People will want to move here,” she said. “Look at the statistics on the EcoNews website. Around 20,000 new jobs were created in the field of solar power last year alone. The fossil fuel industry is cutting jobs.”
- 5 However, real estate developer Carlos Hill cautioned against solar power. “The Mesa Palms solar plant two counties over cost \$2 billion. We can build a natural gas plant for half that amount. Yes, fossil fuels are nonrenewable, but they are still available. We found a large natural gas reserve near where we plan to build.”

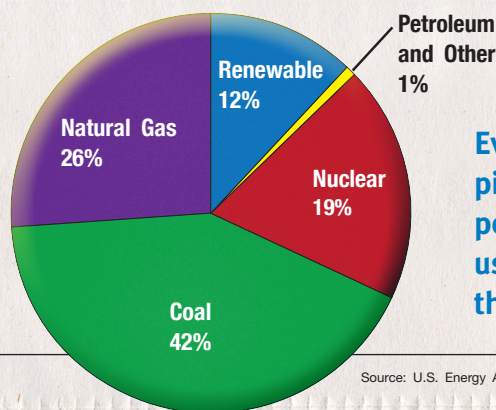
6 At this point, the meeting heated up. “We all have our statistics, Mr. Hill,” said Eve Pearce, a spokesperson for Lightpath Energy. “The Mesa Palms solar plant was expensive. But it generates enough power for 100,000 homes—more than you need! You could make money selling the extra electricity to other towns.”

7 Pearce cited findings from the Environmental Protection Agency. “In 2012, over 70 percent of our electricity came from burning fossil fuels, mostly coal and natural gas,” she said. “In other words, electricity generates the largest share of greenhouse gas emissions,” she stated. “That has to change.”

8 Hill interrupted, saying, “But natural gas is a cleaner fossil fuel. It produces half as much carbon dioxide as coal. And that’s according to the Environmental Protection Agency. Plus, new drilling technologies and mapping tools make extracting the gas more efficient.”

9 No decision was reached at the meeting. Mayor Sanchez promised to hold more public meetings before a decision is made.

U.S. Electricity Net Generation by Fuel



Eve Pearce displayed this pie chart showing the percentages of fossil fuels used to power electricity in the United States in 2012.

Source: U.S. Energy Administration Data

The Hopeville Ledger Morning Edition

Editorial Pages

10 The Ledger *received many Letters to the Editor in response to yesterday's article, "Town Tackles Energy Debate."* Space limits us to printing just these three.

Sunshine Is Free: Go Solar!

11 Hopeville should build a solar plant. Sunshine is free. And unlike nonrenewable fossil fuels, sunshine will always be available.

12 Tom Bradshaw pointed out that "one day of sunlight contains more than twice the energy people could use in one year." His information came from the California Energy Commission, a trustworthy source. I think we have to pay attention to this fact. A solar plant is costly. But it will power clean energy to tens of thousands of homes, or more. As Eve Pearce pointed out, the Mesa Palms solar plant is evidence of that.

13 It may be true, as Mr. Hill said, that we still have plenty of fossil fuels. But fossil fuels won't last forever. Nonrenewable means they cannot be replaced. Someday, they will be gone. We need to be ready when that happens.

14 We should develop technology that helps us generate clean, efficient power. Hopeville should have a solar power plant. The reasons are clear.

—Roy Smith

Remember
to annotate
as you read.

Notes

Natural Gas: The Natural Choice for Hopeville

- 15 I am not against solar power, but Hopeville needs a more cost-effective power source. Natural gas is the better choice right now. It's available and much more affordable.
- 16 The Mesa Palms solar plant cost \$2 billion to build! The federal government will only give Hopeville \$200 million. Where will we get the rest of the money? We won't be able to get that back from the few thousand we might make selling our "extra" electricity to other towns, as Ms. Pearce suggested.
- 17 Carlos Hill makes a strong argument for natural gas. It's right there in the place where the mayor wants to build. Plus, natural gas produces just half the carbon dioxide of our current coal-burning power plant. What's more, new technologies make getting gas out of the ground more efficient. That means even less carbon dioxide in the atmosphere. We could provide power to Hopeville for many years to come with the natural gas reserve in our own backyard.



a natural gas power plant

18 Perhaps in the future, solar power will be cheaper to produce. Right now, the cost-effective source is natural gas.

—Brenda Sparks

Too Many Statistics, Too Few Facts

- 19 The question before Hopeville is do we want solar or natural gas power? We need more information to make a decision. Last night's meeting did not help. People just threw around facts and statistics. They caused more confusion than clarity. We need a group to study both sides of the issue in depth.
- 20 Some people said solar power is too expensive. Their only evidence was the Mesa Palms solar plant. That plant was built five years ago, and it is just one example. Have they looked at others? Do they know why Mesa Palms was so expensive? We need to look more closely. Surely new solar power technologies exist that are less expensive. Plus, we don't need a power plant for one hundred thousand homes. Half the size is all Hopeville needs.
- 21 Some people said natural gas causes too much pollution. But is that true? I've heard conflicting evidence. Eva Pearce said electricity production was responsible for over 70 percent of U.S. greenhouse gas emissions in 2012. What percentage of those emissions is due to natural gas?
- 22 In my opinion, we cannot yet make an informed decision about what kind of power plant to build. That is because we do not have enough information. We should study the facts carefully. Then we can decide whether to choose solar or natural gas energy.

—Rosaria Cruz

Word Study Read

Remember
to annotate
as you read.

Notes

Fossil Fuels: What's the Story?

- 1 Why are fuels like gasoline, coal, and natural gas called fossil fuels? The reason is that they come from plant and animal remains, or fossils. Millions of years ago, Earth was covered by water. When plants and animals died, they sank to the ocean floor. As the years passed, they formed a dark, spongy substance called peat. Over millions of years, sand and rocks gradually buried the peat deeper and deeper. Eventually, the fossils of the plants and animals turned into oil, coal, and natural gas. Today, we burn these products for fuel. That's why oil, coal, and natural gas are called "fossil fuels."
- 2 So what's the problem? Let's continue the story. Every living thing has carbon in it. For example, a 100-pound person is 18 pounds of carbon. When we burn a fossil fuel to generate electricity or power a car, boat, or plane, we release the carbon stored in the fuel. For example, one gallon (6.3 pounds) of gasoline produces about 20 pounds of carbon dioxide, or CO_2 . Carbon dioxide, or CO_2 , is a greenhouse gas. It works to trap heat in Earth's atmosphere. This is good, but only up to a point. An increase in CO_2 in the atmosphere can cause Earth's temperature to rise, changing our planet's climate.
- 3 What's being done? Many nations realize the importance of substituting other sources of energy for fossil fuels. They are looking to wind and solar power, for example, to help meet the world's energy needs.

BuildReflectWrite

Build Knowledge

Reread the *Hopeville Ledger* Editorial Pages. Compare two arguments made by each of the writers, and then decide which editorial is most effective.

	Sunshine Is Free: Go Solar!	Natural Gas: The Natural Choice for Hopeville	Too Many Statistics, Too Few Facts
1			
2			
Most effective editorial:			

Reflect

How do we make decisions about developing new technology?

Based on this week's texts, write down new ideas and questions you have about the essential question.

Writing to Sources

Narrative

Imagine that the town of Hopeville decided to build a solar power plant. Gather text evidence about solar energy plants from "Town Tackles Energy Debate" and the *Hopeville Ledger* Editorial Pages. Then write the opening scene of a story from the perspective of someone working to build Hopeville's new solar energy plant.

Remember
to annotate
as you read.

Green Transportation Solutions

by Brooke Harris

Notes

- 1 Americans own around 250 million cars, nearly one for each person. A typical car travels an average of 19,000 kilometers (12,000 miles) per year. That's equal to going halfway around the world. Covering that kind of territory takes a lot of energy. Most of it comes from burning oil and gas. These fuels, called fossil fuels, are in a limited, and dwindling, supply.



- 2 Burning fossil fuels also produces air pollution, such as when a truck belches a cloud of black smoke. Even worse, burning fossil fuels releases carbon dioxide, a gas. Carbon dioxide and other gases float high into the sky. They trap the sun's heat, like a greenhouse, and raise the planet's temperature. This is called global warming. The result is climate change, which has been linked to extremes in weather, such as droughts, hurricanes, and other weather-related disasters.

Piedmont Biofuel turns used cooking oil into truck fuel. The company collects grease from restaurants and converts it to clean-burning biodiesel.

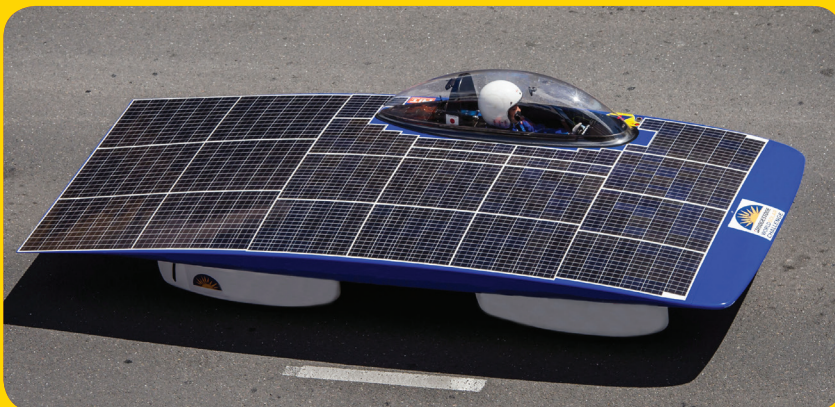


Renewable Fuels

- 5 Running cars with “green” fuels such as biodiesel or ethanol may be a better choice than using fossil fuels. Biodiesel fuel is made from soybeans, palm oil, and other plants. Ethanol is made from corn and sugar. Unlike fossil fuels, green fuels use renewable sources. They also emit fewer greenhouse gases. According to the Renewable Fuels Association, “using ethanol in place of gasoline helps to reduce carbon dioxide emissions by up to 30–50%.” The Oregon Department of Environmental Quality found that ethanol reduces greenhouse gases by 80 percent. Biodiesel has some other advantages. It doesn’t catch fire as easily as gasoline, so it is a safer fuel. Another benefit is that its exhaust smells like popcorn.
- 6 Cars that have diesel engines can run on biodiesel fuel. Most cars, however, need to be converted, or changed, to handle renewable fuels. That’s doable for a few thousand dollars. But solutions for one problem often lead to new problems. As crops are turned into fuel for cars, food prices could go up.

Public Transportation

- 7 The New York City subway system has more than five million riders on weekdays. According to the report “New York City’s Green Dividend,” residents save \$19 billion a year because they own fewer cars and drive less than average Americans.
- 8 Dozens of big cities in the United States have subways or some other type of rapid transit. Running subways, trains, and buses takes energy. Often, that energy comes from burning fossil fuels. But the cost to the environment per person is considerably less. As public transportation options improve, cars become less of a “necessary evil.” A subway line can improve the quality of life for a town as well.



Solar Cars

Some engineers are looking to the sun to solve the problem of burning fuel to run cars. Cars powered directly by solar panels don't use any fossil fuels. Although these cars are in the experimental phase, some are quite impressive. The Tokai Challenger shown here won a number of solar car races. It went 3,380 kilometers (2,100 miles) in under 30 hours, for an average speed of 100.5 kmph (63 mph). A few questions come to mind: How much does it cost? What happens if it is cloudy? And where do you put the groceries, or passengers for that matter?

- 9 The Washington, D.C. Orange Line, part of the city's Metrorail, or Metro, is a model of transportation planning. The Orange Line was built underneath a main street of suburban Arlington, Virginia, in the 1970s. People moved to live near the Metro. High-rise apartment buildings soon developed along nearby Fairfax Drive. Dying businesses in the Virginia Square area came alive and new ones opened. More stores, restaurants, and movie theaters followed. In 2008, the American Planning Association named the main street one of the top 10 "Great Streets" in the United States.
- 10 "I think we were bold at the time, and it has paid off. I can't imagine what this area would be like without it," says Jay Ricks, a former board member in Arlington County, Virginia.



Thousands of people in Arlington, Virginia, commute to Washington, D.C. each day.



An efficient subway system called the Metro has drawn new residents to Arlington, Virginia.

Notes

- 11 Tens of thousands of people today ride the Orange Line to their jobs in Washington, D.C. The daily commute is easier than driving. “I can relax or read instead of losing my temper while sitting in traffic,” says Joel Max, a Metro rider for over thirty years. “The Beltway is a living nightmare during rush hour.” In the past ten years, Max’s company has paid for part of his Metro pass. They, too, want to combat congestion and encourage the use of public transportation. “With the rising price of gas and parking, commuting is now actually cheaper,” Max says happily.

Boulder, Colorado: Biped Power

12 Green cars and alternative fuels help reduce car emissions. Public transportation helps reduce car pollution and traffic problems. There's another green transportation solution that's simple, effective, and right in front of your eyes—your own two feet! Walking and bicycling eliminate the need for cars and public transportation. These low-tech solutions need little more than the support of governments to put into place.

13 Heatherwood Elementary School in Boulder, Colorado, more than tripled the number of kids who now walk and bike to school. The percentage increased from 12 to 43 percent. How did they do it? The school worked with the state to add sidewalks and crosswalks, lower the speed limit near the school, and provide crossing guards. An annual bike rodeo teaches bicycle safety. The school also gives a "Golden Sneaker" award to the classroom that logs the most of both bicycle and walking distances.

Walking and riding bikes to school is good for kids' health and the health of the planet.





▲ Many cities have created bike paths and bike-sharing programs.

◀ In Boulder, Colorado, an annual bike rodeo teaches bicycle safety.

14 Walking and biking to and from school also sends children on their way to the sixty minutes of daily exercise recommended by the American Public Health Association. A 45-kilogram (100-pound) person who walks at a moderate pace (5 kilometers, or 3 miles, per hour) will burn 100 calories in a half hour. Biking at a good rate (21 kmph, or 13 mph) for fifteen minutes achieves the same results.

15 Students win in other ways, too, explained teacher Tom Ampson. “In addition to feeling good about being part of the solution against pollution, students get more exercise and have fun. Walking or riding together builds friendships and a healthful lifestyle.”

Word Study Read

Remember
to annotate
as you read.

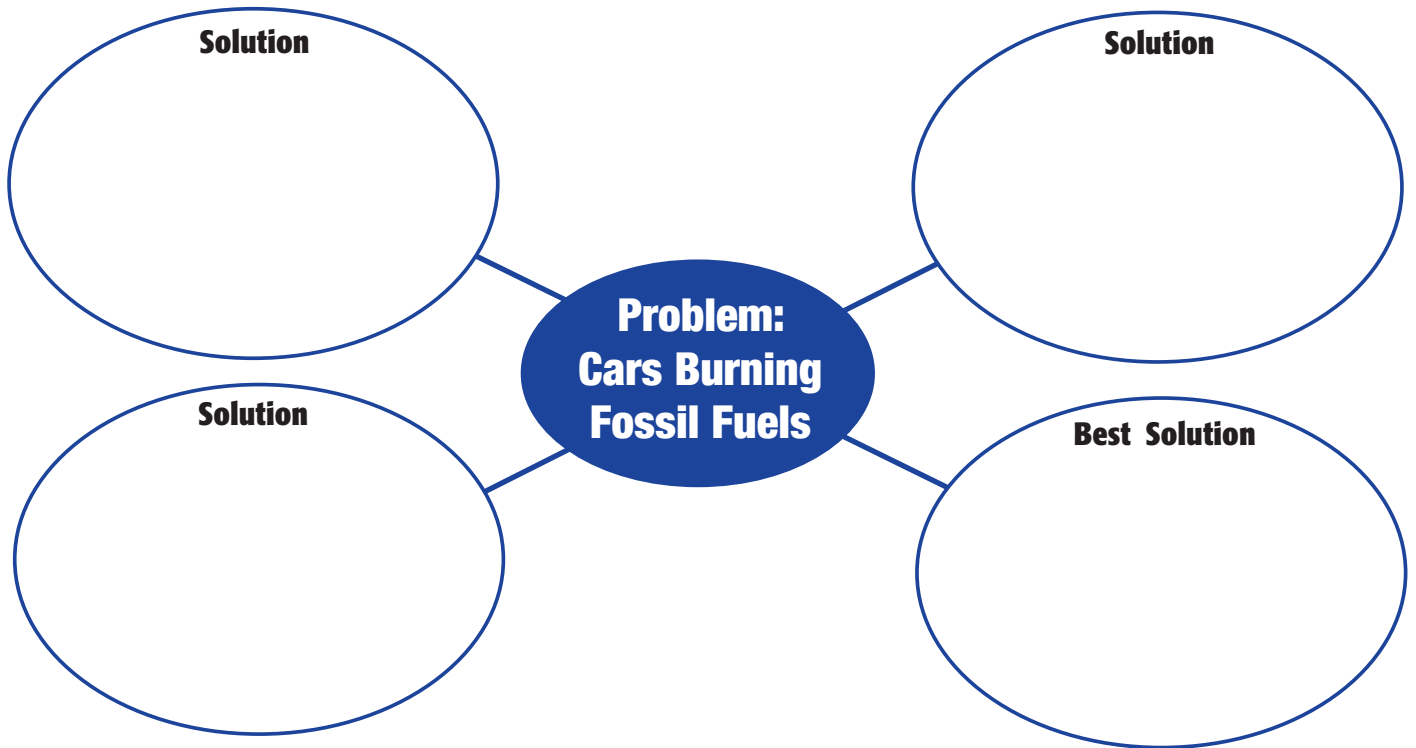
Notes

The Solar Challenge

- 1 My team's solar-powered car reached the finals in the World Solar Challenge and we headed to Australia for the race. Teams from all over the world were there. Luckily for us, there were only four other high school teams. Most of the other competitors were universities or corporations. To win, a vehicle had to travel 3,000 kilometers, or around 1,900 miles.
- 2 The race was all about solar energy! Each vehicle was allowed five kilowatt-hours of stored energy, but that's only about 10 percent of the energy needed. The other 90 percent had to come from the sun, so weather definitely mattered.
- 3 According to the rules, we were allowed to drive 9 hours daily, with compulsory 30-minute stops at checkpoints along the route. We charted the course. To win, we would have to drive about 700 kilometers a day, close to 450 miles!
- 4 The first day we were doing well. The college teams were beating us, but we were leading all the high school teams! We were worried when clouds covered the sun for hours, almost draining our solar battery. Fortunately, the sun came out again before we lost all our power. The solar panels on the top of the car started capturing the solar energy and recharging our battery, so we could keep going. Whew!
- 5 Victory! We didn't win the overall race, but we had the best time of the high school teams. The crowd roared its congratulations. We'll definitely be back next year!

Build Knowledge

“Green Transportation Solutions” discusses a problem: too many cars are burning fossil fuels. Create a web to identify possible solutions. Then, decide which one, or which combination, would best solve the problem.



Reflect

How do we make decisions about developing new technology?

Based on this week’s texts, write down new ideas and questions you have about the essential question.

Writing to Sources

Informative/Explanatory

Both “Green Transportation Solutions” and *The Hopeville Ledger* discuss the positive and negative effects of fossil fuels. Using information from these two sources, write a five-paragraph informational essay in which you explain the ways fossil fuels affect our energy use, our economy, and our environment.

Remember
to annotate
as you read.

Notes

Opinions About Green Transportation

In “Green Transportation Solutions,” Brooke Harris presents several solutions to pollution from automobiles. Which solution is the “best”? Four writers express their opinions and give their reasons. All of the writers support their positions with facts and details from Harris’s article.

Opinion 1: Solar Power for a Bright Future

1 The best green transportation solution is the use of solar cars that people can afford. Solar-powered vehicles use no fossil fuels. They completely eliminate our need to burn fossil fuels for transportation. Not everyone can rely on buses and subways. Solar cars offer a completely clean solution for drivers.

2 As “Green Transportation Solutions” makes clear, hybrid and electric cars are not perfect solutions. Battery-powered plug-in cars require that people charge their cars’ batteries. Although battery-powered cars do not burn fossil fuels, “Power plants that make electricity to charge the car’s battery” do. Hybrid cars reduce people’s use of fossil fuel, but they don’t eliminate it. And cars that run on renewable fuels such as biodiesel and ethanol still emit carbon dioxide (CO₂). Solar-powered vehicles emit no carbon dioxide.

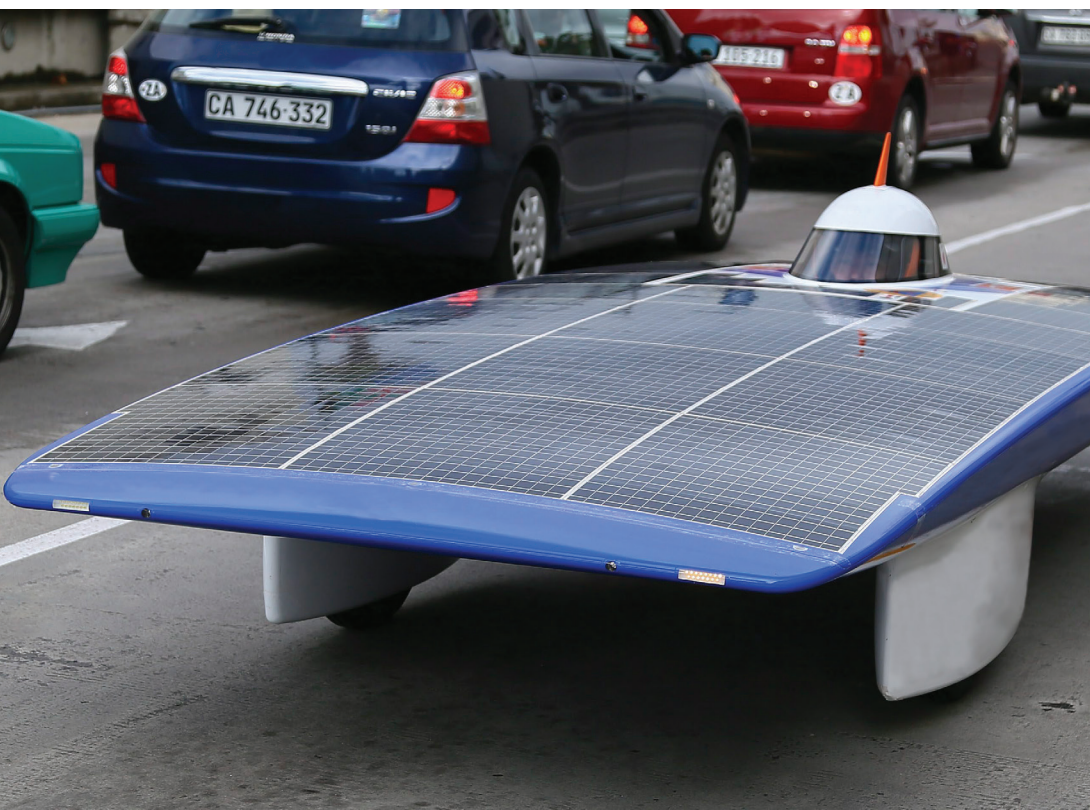
Notes

- 3 Brooke Harris makes a case for public transportation, too, but this is another incomplete solution. Subways and buses in cities like New York City and Arlington, Virginia, mean fewer cars on city streets, but they don't meet the needs of everyone. Not only that, but buses and trains still rely on some fossil fuel.

- 4 The best long-term "green" solution is the use of solar vehicles. Solar power eliminates the need for fossil fuels. Solar cars provide pollution-free transportation to people who can't rely on public transportation.



Solar cars may not be the most practical solution now, but they are the right choice for the future.



Opinion 2: Catch a Seat on the Bus

- 5 Public transportation is the “green” solution that makes the most sense today. Solar cars are still experimental. Hybrid and biodiesel cars are very expensive, so most people cannot afford them. On the other hand, public transportation is affordable. It meets the needs of many people.
- 6 As Brooke Harris explains in “Green Transportation Solutions,” today’s cars burn fossil fuels. They release harmful carbon dioxide gas. Unfortunately, tomorrow’s cars are not yet practical or affordable. A battery-powered plug-in car costs about \$40,000. It can go only 160 kilometers (100 miles) before needing a charge. Even if people could afford that price tag, it wouldn’t make sense. Where would the cars recharge? As Harris points out, “Charging stations are not available in many places.” Battery-powered cars are tomorrow’s solution. They don’t help us today.



Chicago is one of the biggest cities now using hybrid buses.

7 The average hybrid car is a little more affordable (about \$30,000), but it still burns fossil fuels. If everyone switched to a hybrid car, we would only lower carbon dioxide emissions. We would not eliminate them. Replacing one set of fossil-fuel burning cars with another is not a long-term solution.

8 On the other hand, public transportation takes cars off the roads. Harris cites New York City's Green Dividend report. It states, "Residents save



An estimated 400,000 people use San Francisco's Bay Area Rapid Transit (BART) system to commute to work each day.

\$19 billion per year because they own fewer cars and drive less than average Americans." This shows that public transportation can work. While green subways and buses still emit some carbon dioxide, they more than compensate for this. By eliminating the need for millions of cars on the city's roads, public transportation substantially reduces harmful emissions.

9 Solar cars are still experimental. And replacing fossil-fuel-burning cars with "green" cars is not yet practical. They are too expensive, and they are only partial solutions to the problem. When people and cities work together for green public transportation, cars come off the roads. The environment wins.

Opinion 3: Fight Pollution and Get Fit

10 In “Green Transportation Solutions,” Brooke Harris explores many expensive, high-tech “green” solutions. But the solution that makes the most sense is the low-tech one. People who can walk or ride a bike should stop using forms of transportation that burn fossil fuels. If everyone who could do this made that choice, the planet would benefit and so would they.

11 Most people’s lives revolve around their home. Unless they live in a rural area or have a long ride to school or work, they can walk or bike to a lot of places. The example of Heatherwood Elementary School proves that people would do this, if they could do it safely. By adding sidewalks, crosswalks, and crossing guards, Heatherwood Elementary School more than tripled the number of students who walked and biked to school—from 12 to 43 percent.

These kids are taking a “walking bus” to school.





Notes

- 12 Going green with fewer car or bus trips helps the environment. It helps people, too. Walking and biking are good exercise. As Harris notes in “Boulder, Colorado: Biped Power,” walking a half hour a day burns up 100 calories for a person who weighs 45 kilograms (100 pounds). Riding a bike for just fifteen minutes will give the same results.
- 13 A green car is not the only solution to greenhouse gas emissions. Many people can contribute to a cleaner planet simply by leaving their cars in the garage. By walking or biking, people help the planet and improve their health.

Opinion 4: No Single Solution Can Solve a Big Problem

14 There is no “best” solution to reduce carbon dioxide emissions. That is because no single solution meets the transportation needs of every person. We need multiple solutions. People who must drive need green cars. People in cities should use public transportation as often as possible. And people who are able to walk or ride bikes should have safe ways to do this. Only with green solutions that meet different needs will we significantly reduce carbon dioxide emissions.

15 As Brooke Harris points out, Americans now own approximately 250 million cars. While many people in cities could choose public transportation, some people cannot. For those who can't, green cars are the answer. A car that runs on ethanol emits from 30 to 50 percent less carbon dioxide than a fossil-fuel burning car. A biodiesel car releases 80 percent less CO₂. This technology must be developed. Practical and affordable green cars will help the planet.



There are many “green” transportation solutions to choose from.

16 In addition, we can reduce emissions by keeping cars off the road. Many Americans can use public transportation. In New York City, five million people ride the subway every day. Because they are on the subway, they are not in a car. “Tens of thousands of people” use Washington, D.C.’s Orange Line each day. This subway line has turned many car drivers into public transportation commuters.

17 People who commute short distances between home and work or school do not need subways and buses to stay out of cars. As Harris states, “Walking and bicycling eliminate the need for cars and public transportation. These low-tech solutions need little more than the support of governments to put into place.” One school in Colorado increased the number of students walking or biking to school by 31 percent! That is a huge increase. It shows that if people can walk and bike safely, they will.

18 No single form of transportation meets everyone’s needs. Green cars, public transportation, and “biped power” are each a partial solution to a big problem. Together, however, these three solutions can make a big impact on people and our planet.



Word Study Read

Remember
to annotate
as you read.

Notes

America's Greenest City

- 1 In my opinion, the city of Portland, Oregon, is one of the greenest cities in America. There are several reasons why this is true.
- 2 Each day, about a quarter of Portland workers commute by bike, carpool, or public transportation. Of these, 10,000 people bike to work on the city's 1,106 kilometers (700 miles) of bicycle paths.
- 3 And that's just the beginning. In 1987, Portland put its first recycling system in place. Portlanders now recycle two-thirds of their waste. That's one of the highest rates in the United States. Another fact is that city residents can choose to get their electricity from wind and solar sources. Even the parking meters are solar-powered.
- 4 Portland was also the first U.S. city to adopt a Global Warming Action Plan. Following this plan, Portland and the surrounding area were able to curb greenhouse gases by almost 13 percent. During this period, the greenhouse gases emitted in the rest of the United States were actually increasing.
- 5 If all this hasn't convinced you that Portland is the nation's greenest city, consider this. The city has 10,000 acres of parkland. This means that most people are within a half-mile walk to the nearest park. These parks help make Portland a truly green city!

BuildReflectWrite

Build Knowledge

Reread “Opinions About Green Transportation.” List three key arguments for each essay. Predict the effect of each proposal.

	Solar Power for a Bright Future	Catch a Seat on the Bus	Fight Pollution and Get Fit	No Single Solution Can Solve a Big Problem
1				
2				
3				
Predicted effect:				

Reflect

How do we make decisions about developing new technology?

Based on this week’s texts, write down new ideas and questions you have about the essential question.

Writing to Sources

Opinion

In “Opinions About Green Transportation” and the *Hopeville Ledger* Editorial Pages, you read other people’s opinions on green energy. Choose an editorial you disagree with, and write a response in which you argue against the opinion expressed by the writer. Make sure to support your opinion with concrete facts, details, and examples from at least two texts in this unit.

Support for Collaborative Conversation

Discussion Prompts

Express ideas or opinions . . .

When I read _____, it made me think that _____.

Based on the information in _____, my [opinion/idea] is _____.

As I [listened to/read/watched] _____, it occurred to me that _____.

It was important that _____.

Gain the floor . . .

I would like to add a comment. _____.

Excuse me for interrupting but _____.

That made me think of _____.

Build on a peer's idea or opinion . . .

That's an interesting point. It makes me think _____.

If _____, then maybe _____.

[Name] said _____. That could mean that _____.

Express agreement with a peer's idea . . .

I agree that _____ because _____.

I also feel that _____ because _____.

[Name] made the comment that _____, and I think that is important because _____.

Respectfully express disagreement . . .

I understand your point of view that _____, but in my opinion _____ because _____.

That is an interesting idea, but did you consider the fact that _____?

I do not agree that _____. I think that _____ because _____.

Ask a clarifying question . . .

You said _____. Could you explain what you mean by that?

I don't understand how your evidence supports that inference. Can you say more?

I'm not sure I understand. Are you saying that _____?

Clarify for others . . .

When I said _____, what I meant was that _____.

I reached my conclusion because _____.

Group Roles

Discussion director:

Your role is to guide the group's discussion and be sure that everyone has a chance to express his or her ideas.

Notetaker:

Your job is to record the group's ideas and important points of discussion.

Summarizer:

In this role, you will restate the group's comments and conclusions.

Presenter:

Your role is to provide an overview of the group's discussion to the class.

Timekeeper:

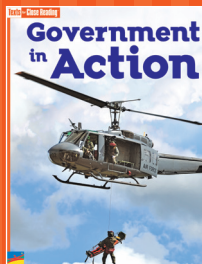
You will track the time and help to keep your peers on task.

Making Meaning with Words

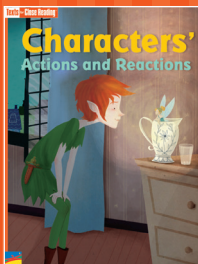
Word	My Definition	My Sentence
compensate (p. 25)		
dependence (p. 13)		
economy (p. 5)		
eliminate (p. 18)		
emit (p. 22)		
encouraged (p. 13)		
evidence (p. 7)		
experimental (p. 15)		
minimum (p. 13)		
statistics (p. 5)		

Build Knowledge Across 10 Topic Strands

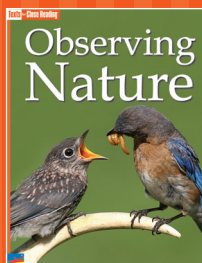
Government and Citizenship



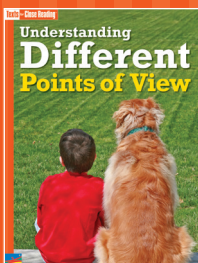
Character



Life Science



Point of View



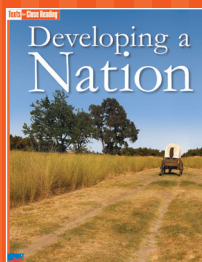
Technology and Society



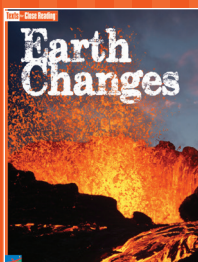
Theme



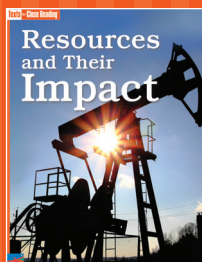
History and Culture



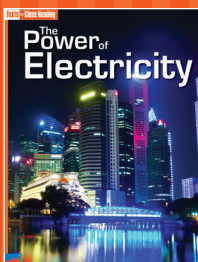
Earth Science



Economics



Physical Science



Grade 4 • Unit 5

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