

A Cool Connection

"I still think it's about getting people to see how it's all connected. I just wish people understood how the things they do impact the environment." Hanna was talking to the rest of her Ecology Club officers. As the new president of the student group, it was her job to organize the back-to-school activities for September. It was also her decision to move the meeting from the city park to escape the stifling 95-degree heat of August. This was how the six high school students came to be crowded around the living room in the air-conditioned apartment of Daryl, the club's secretary.

"Help yourselves to soda," Daryl offered. "It's in the refrigerator."

Kue immediately raced to the kitchen. "This is fantastic—air conditioning and a refrigerator full of food!" Rejoining the group with a root beer and a piece of cold meatloaf, he passed the thermostat that controlled the temperature in the apartment. Noticing it was set to 77 degrees, he turned the **thermostat** down to 75 degrees. Electricity flowed from the **transformer** drum on the pole near the street into the house. The **electric meter** on the outside of the building spun a little faster and the air conditioner made the apartment a little cooler.

"I agree with Hanna," Kue said. "People still don't see that it's all connected. I think we should make some posters."

Vicky returned from her trip to the kitchen with a bottle of mineral water and a handful of small carrots. Passing the thermostat, she nudged the setting down to 73 degrees. The **electrical substation** in the nearby industrial park delivered a little more electricity to the transformer drum on the pole near the street. The electric meter spun a little faster and the air conditioner made the apartment a little cooler.

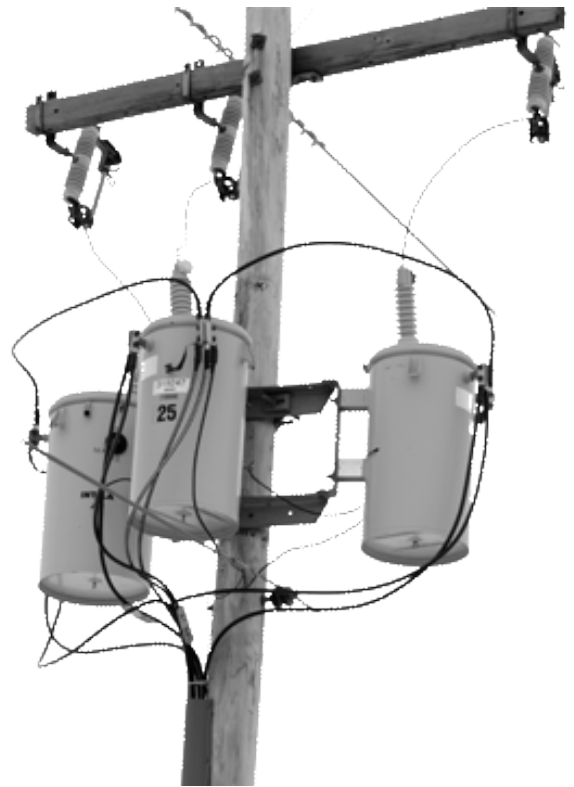
"No, I think we need bumper stickers," Vicky insisted. "That would help people see that it's all connected"

Lucy made a trip to the refrigerator and came back with a glass of milk. Like the rest of the officers of the environmental group, she turned the thermostat down a little more—this time it stopped at 71 degrees.

The **transmission line** that ran just outside of town delivered a little more electricity to the substation in the nearby industrial park. Before reaching town, the massive line **bisected** farms, forests, and even National Park land. Several years ago, many landowners were required by the **eminent domain** law to allow the line to cross their property. The line carried 345 **kilovolts**, over three conductors, on towers that were 90 feet high. The utility company placed towers every 1000 feet and cleared a 150 feet wide path of all trees.

The treeless corridor helped to fragment the forest by creating less uninterrupted interior and more forest edge. Some animals thrive on the forest edge—some do not. Many songbirds nest in the dense forests to avoid predators. Raccoons, opossums, and skunks are nest predators and use the newly created forest edge like aisles in a supermarket, leading straight to fresh eggs and tender baby birds. The increase in edge also allows the brown-headed cowbird to extend its range beyond the prairies and open fields. This **brood parasite** lays its eggs in the nests of small songbirds and leaves the host parents to raise the young.

The electric meter on Daryl's apartment building spun a little faster and the air conditioner made the house a little cooler. "What if we made tee-shirts that told people how their actions were all connected to our environmental problems?" Lucy offered.



"It's so hot outside, maybe we should hand out fliers at the mall. It's air conditioned." Miguel suggested. He walked to the thermostat and turned the temperature down even lower.

"Stop messing with the thermostat," Daryl shouted. "My mom gets mad if I change her settings."

"You said she won't be home until tonight. We'll set it back when it cools off outside."

Meanwhile, in Manitoba, Canada, twelve hydroelectric plants produced electricity day and night. The power they created was free of the carbon dioxide emissions from fossil fuels and did not produce the dangerous wastes inherent to nuclear power. However, it was not without costs. When the Nelson River was dammed, the rising water flooded vast areas of wilderness. The historic path of the river changed and some lakes dried up. Because the water level in the artificial lake was **manipulated** to increase power production, the banks of the reservoir eroded and the water turned muddy.

The environmental impact of the Manitoba Hydro project covers 50,000 square miles—an area about the size of the state of Wisconsin. The area that is home to an expansive power production facility is also the home of the Pimicikamak Cree. Rice beds, fishing and hunting grounds, as well as ancestral burial sites are now under water.

Electricity generated from this once pristine land flowed through transmission lines that bisect Northwestern Wisconsin and pass just outside of town. The line delivered a little more electricity to the substation in the nearby industrial park, which delivered a little more electricity to the transformer drum on the pole near the street. The electric meter spun a little faster and the air conditioner made the apartment a little cooler.

"I guess I should feel guilty about using the air conditioner, but I only use it when it's really hot," Daryl said.

"...and it's really hot today! Set the thermostat as low as it can go!" Kue moved to the floor, sitting in front of the air conditioning duct so the cool air flowed up the back of his Earth Day tee shirt.

"Enough about the air conditioning," Hanna demanded. "Let's get back to finding a way to help people see how the choices they make are connected to environmental problems."

The Ecology Club was not alone in choosing air-conditioned comfort. Across the city, in fact across the entire southern third of the state, hundreds of thousands of homes and businesses were turning down their thermostats "just a little." Their electric meters each spun a little faster and their air conditioners made their life a little more comfortable.

In an air-conditioned office building, Jack Marino, an analyst for the regional power company, and his supervisor Judy Johansen, were reviewing a computer printout of **peak loads** for the day. "Hey, Judy, look at these numbers. Demand for electricity may hit an all-time high this afternoon."

"Millions of people are huddled around their air conditioning today. The Weather Channel says the heat wave may be sticking around for the rest of the week."

"It's on hot days like this that we risk **brownouts**, or even **blackouts**. People want electricity when they turn on a switch, but when everyone turns a switch at the same time..."

"...we've got a problem!" Jack turned in his office chair to face Judy. "Our capacity needs to be in place to meet demand or people could die! Can you imagine how difficult it would be for the sick and elderly if they suddenly had no air conditioning? Many of those older apartment buildings don't even have windows that open."

"Do you remember [that week in 1995 when over 700 people in Chicago died in a heat wave?](#)"

"How could I forget?"

"Keep that data on peak loads handy," Judy said. "We'll need it for the public hearings on our new transmission line proposal."

Jack stapled the printout and slipped it into a manila folder. "No one wants a power line or a power generating plant, but they still want unlimited electricity. People just don't see how it's all connected."

"Do you think we should have some posters printed?"

A COOL CONECTION

A Play in One Act

By

Joe Riederer

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Cast of Characters

Narrator:

Hanna: A high school student; president ecology club

Daryl: A high school student; secretary ecology club

Kue: A high school student; ecology club officer

Vicky: A high school student; ecology club officer

Lucy: A high school student; ecology club officer

Miguel: A high school student; ecology club officer

Jack Marino: regional power company analyst

Judy Johansen: regional power company supervisor

Scene

An average-sized city in Wisconsin.

Time

The present. Mid-August.

Scene 1

SETTING: We are in the living room of a modern townhouse in a new subdivision, in an average-sized city in Wisconsin. A mid-summer heatwave has taken over the town.

AT RISE: Seven high school students are gathered in the living room. Some are sitting on furniture, some are sitting on the floor.

HANNA

I still think it's about getting people to see how it's all connected. I just wish people understood how the things they do impact the environment.

NARRATOR

Hanna was talking to the rest of her Ecology Club officers. As the new president of the student group, it was her job to organize the back-to-school activities for September. It was also her decision to move the meeting from the city park to escape the stifling 95-degree heat of August. This was how the six high school students came to be crowded around the living room in the air-conditioned apartment of Daryl, the club's secretary.

DARYL

Help yourselves to soda. It's in the refrigerator.

NARRATOR

Kue immediately raced to the kitchen.

KUE

This is fantastic—air conditioning and a refrigerator full of food!

NARRATOR

Rejoining the group with a root beer and a piece of cold meatloaf, Kue passed the thermostat that controlled the temperature in the apartment. Noticing it was set to 77 degrees, he turned the thermostat down to 75 degrees. Electricity flowed from the transformer drum on the pole near the street into the house. The electric meter on the outside of the building spun a little faster and the air conditioner made the apartment a little cooler.

KUE

I agree with Hanna. People still don't see that it's all connected. I think we should make some posters.

NARRATOR

Vicky returned from her trip to the kitchen with a bottle of mineral water and a handful of small carrots. Passing the thermostat, she nudged the setting down to 73 degrees. The electrical substation in the nearby industrial park delivered a little more electricity to the transformer drum on the pole near the street. The electric meter spun a little faster and the air conditioner made the apartment a little cooler.

VICKY

No, I think we need bumper stickers. That would help people see that it's all connected.

NARRATOR

Lucy made a trip to the refrigerator and came back with a glass of milk. Like the rest of the officers of the environmental group, she turned the thermostat down a little more—this time it stopped at 71 degrees.

The transmission line that ran just outside of town delivered a little more electricity to the substation in the nearby industrial park. Before reaching town, the massive line bisected farms, forests, and even National Park land. Several years ago, many landowners were required by the eminent domain law to allow the line to cross their property. The line carried 345 kilovolts, over three conductors, on towers that were 90 feet high. The utility company placed towers every 1000 feet and cleared a 150-foot wide path of all trees.

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The electric meter on Daryl's apartment building spun a little faster and the air conditioner made the house a little cooler.

LUCY

What if we made tee-shirts that told people how their actions were all connected to our environmental problems?

MIGUEL

It's so hot outside, maybe we should hand out fliers at the mall. It's air conditioned.

NARRATOR

Miguel walked to the thermostat and turned the temperature down even lower.

DARYL (*shouting*)

Stop messing with the thermostat. My mom gets mad if I change her settings.

MIGUEL

You said she won't be home until tonight. We'll set it back when it cools off outside.

NARRATOR

Meanwhile, in Manitoba, Canada, twelve hydroelectric plants produced electricity day and night. The power they created was free of the carbon dioxide emissions from fossil fuels and did not produce the dangerous wastes inherent with nuclear power. However, it was not without costs. When the Nelson River was dammed, the rising water flooded vast areas of wilderness. The historic path of the river changed and some lakes dried up. Because the water level in the artificial lake was manipulated to increase power production, the banks of the reservoir eroded and the water turned muddy.

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DARYL

I guess I should feel guilty about using the air conditioner, but I only use it when it's really hot...and it's really hot today! Set the thermostat as low as it can go!

NARRATOR

Kue moved to the floor, sitting in front of the air conditioning duct so the cool air flowed up the back of his Earth Day tee shirt.

HANNA

Enough about the air conditioning. Let's get back to finding a way to help people see how the choices they make are connected to environmental problems.

Scene 2

SETTING: We are in a well-lit office with several desks, each with three monitors on each computer.

AT RISE: Jack Marino and Judy Johansen are flipping through printouts of graphs and tables.

NARRATOR

The Ecology Club was not alone in choosing air-conditioned comfort. Across the city, in fact across the entire southern third of the state, hundreds of thousands of homes and businesses were turning down their thermostats "just a little." Their electric meters each spun a little faster and their air conditioners made their life a little more comfortable.

In an air-conditioned office building for the regional power company, Jack Marino reviewed a computer printout of peak loads for the day.

JACK

Hey, Judy, look at these numbers. Demand for electricity may hit an all-time high this afternoon. Millions of people are huddled around their air conditioning today. The Weather Channel says the heat wave may be sticking around for the rest of the week.

It's on hot days like this that we risk brownouts, or even blackouts. People want electricity when they turn on a switch, but when everyone turns a switch at the same time...

JUDY

...we've got a problem! Our capacity needs to be in place to meet demand or people could die! Can you imagine how difficult it would be for the sick

and elderly if they suddenly had no air conditioning? Many of those older apartment buildings don't even have windows that open.

JACK

Do you remember that week in 1995 when over 700 people in Chicago died in a heat wave?

JUDY

How could I forget? Keep that data on peak loads handy. We'll need it for the public hearings on our new transmission line proposal.

NARRATOR

Jack stapled the printout and slipped it into a manila folder.

JACK

No one wants a powerline or a power generating plant, but they still want unlimited electricity. People just don't see how it's all connected.

JUDY

Do you think we should have some posters printed?

Name _____ **Teacher Edition**

A Cool Connection: Powerful Concepts

Task 1:

Using context cues, online resources, and a dictionary, explain the following terms and concepts found in the story.	
Thermostat	
Electrical Transformer	
Electrical Substation	
Electric Meter	
Transmission Line	
Kilovolt	
Bisected	
Brood Parasite	
Eminent Domain Law	
Manipulate	
Peak Load	
Brownout	
Blackout	

Task 2:

List the steps electricity went through to get from the power plant to the apartment in the story.	
Step 1	Hydroelectric plants in Manitoba, Canada
Step 2	
Step 3	
Step 4	
Step 5	
Step 6	Air conditioner in Daryl's apartment

Task 3:

Construct a convincing argument that **supports** or **refutes** the following claim:
“The use of air conditioners by able-bodied adults is bad for the environment and should be avoided.”

- cite evidence from reputable sources
- present an oral or written argument that explains your reasoning

A Cool Connection: Powerful Concepts

Task 1:

Using context cues, online resources, and a dictionary, explain the following terms and concepts found in the story.	
Thermostat	Control the temperature in a building
Electrical Transformer	Increases (step-up) or decreases (step-down) voltage
Electrical Substation	Uses transformers to lower voltage and then distribute electricity to users
Electric Meter	Measures the power used by a home for billing purposes
Transmission Line	Carries high voltage current across long distances
Kilovolt	1000 volts
Bisected	Cut in half
Brood Parasite	An organisms that rely on others to raise their young
Eminent Domain Law	The power of a state or the federal government to take private property for public use while requiring "just" compensation
Manipulate	To handle or control
Peak Load	The highest amount of energy that consumers draws from the grid at one time.
Brownout	An intentional or unintentional drop in voltage in an electrical power supply system
Blackout	An intentional or unintentional loss of electric power

Task 2:

List the steps electricity went through to get from the power plant to the apartment in the story.	
Step 1	Hydroelectric plants in Manitoba, Canada
Step 2	Transmission line that ran across the state
Step 3	Electrical Substation in the industrial park
Step 4	Transformer drum on a pole
Step 5	Electric meter outside Daryl's apartment
Step 6	Air conditioner in Daryl's apartment

Task 3:

Construct a convincing argument that **supports** or **refutes** the following claim:
“The use of air conditioners by able-bodied adults is bad for the environment and should be avoided.”

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