

## CRISIS IN THE ATL!: TEACHER GUIDE

**Subject:** Physical Science  
**Grade Level:** Middle School  
**Last Updated:** 2/21/06

### Case Summary

It's a steamy summer day in Atlanta when suddenly the power blinks out over the entire city! To make matters worse, all of the electricians in the area are out of town at a conference. Mayor Shirley Franklin is offering a \$20,000 reward to anyone who can put together a proposal that details what probably went wrong and how to fix it. Since you are in a suburb that still has power, help your Atlanta friends put together a presentation for the mayor so the problem can be fixed and you can win the reward.

### Credits

This case was created by Bethany L. Turner (PhD candidate, Department of Anthropology, Emory University, Atlanta, GA) and Katherine Shamsid-Deen (science teacher, Columbia Middle School, Decatur, GA), fellows of the Emory University PRISM program (<http://www.prism.emory.edu>). Authors may be contacted at [blturne@learnlink.emory.edu](mailto:blturne@learnlink.emory.edu)

### Learning Objectives

1. Define "power-out" and explain what can cause one.
2. Describe the properties of electricity, including types of currents & how electricity travels.
3. Explain how electricity is produced and distributed, and types of resources that are commonly used.
4. Diagram the way that electricity works, from a simple household circuit to a power plant.
5. Identify what could have caused a power-out that is at the city-wide level, especially during the summer, and show how it could have happened.
6. Define key terms including direct vs. alternating currents, fuses, circuits, wattage, voltage, transformer and power plant.

### Georgia Performance Standards

- SCSh3*. Students will identify and investigate problems scientifically. (NSES Content Standard A).
- S8P5*. Students will recognize characteristics of gravity, electricity, and magnetism as major kinds of forces acting in nature. (NSES Content Standard B)
- b. Demonstrate the advantages and disadvantages of series and parallel circuits and how they transfer energy.

## Assessment

Students will produce a poster that presents solutions to the power-out problem and details how the power-out likely happened. See the **Poster Guidelines** in the *Student Materials Document*.

While the students will receive group grades, the teacher will include facilitator observations and student evaluations of their group members' participation and effort in her/his assessments. See the **Self Evaluation Worksheet** in the *Student Materials document*.

## Implementation Strategy

This case is designed to take place over one 60-minute class session and four 90-minute class sessions. It has three scripted scenes, the third of which is mostly an epilogue. Students work in groups of 4-5 individuals. This case can be facilitated by one or two facilitators, because rather than placing a facilitator with every group, the students spend time brainstorming with their group and then as a whole class.

The brainstorming session described below involves students reading, discussing and taking notes in their groups in 10 minute blocks (totaling about 25 minutes per scene), then reconvening as a whole class to volunteer their observations, questions, hypotheses and learning issues (learning issues are things that students say they need to know or look up to define unknown terms, answer their questions, and/or test their hypotheses) at the end of every 10-minute block. During the group brainstorming, the teacher/facilitators float from group to group, checking progress and helping students with any stumbling blocks they may have. During the whole-class volunteering time, the teacher/one of the facilitators takes notes on an overhead or with a Smart Board. In this way, students can learn to work as a team while still benefiting from sharing their information as a whole class or even competing with other groups for volunteering, while the teacher can make sure that all students are at the same point in the case at each step.

This case was designed for approximately five days of implementation. This assumes a block schedule, where Tuesday-through-Friday classes are given ninety minutes, while the first day of the case (Monday) runs for sixty-minutes.

Day 1 – Read scene 1; fill out box chart, brainstorm and strategize.

*Homework:* Research scene 1 learning issues in textbook or online.

Day 2 – Discuss learning issues with group, share ideas and insights from homework (~20 min.). Computer Lab: explore PRISM-Columbia Middle webpage with useful links (~45 minutes). Read Scene 2 and start filling out box chart (~25 min.).

*Homework:* Finish scene 2 box chart; research learning issues in textbook, online and other resources of choice.

Day 3 – Compile research findings and discuss in groups (~45 min.); work on blueprint for poster (~45 min.)

Day 4 – Work on poster (allow the group members to divide up tasks based on their individual strengths, i.e. artistic ability, writing skills).

Day 5 – Finish posters (~40 min.). Set up posters for group viewing (~30 min.); group evaluation, case wrap-up (~20 minutes).

## Case Notes

### *Things that went well:*

- The script. We paid a great deal of attention to phrasing and made reference to contexts, radio stations and other features that are both popular among younger teens and specific to Atlanta, which made the scenes fun for students to read aloud to the class. There were plenty of volunteers and it kicked the case off in a good way.
- The Resource Web site. We made the format of the Web page very dark and included photos of New York City at sunset during the large-scale power out of summer 2004 to give the students a visual sense of what was described in the scenes. During their computer lab time, we turned off the lights so they could see the resources page better and so they could get more into the theme. As always, the Web page allowed us to frame their research while still letting them do the research in teams or independently, and the fact that it is online for the duration of the case meant that the students could continue their research outside of class.
- The poster product. Since this case was implemented at the end of the school year, the students benefited from a creative product that allowed them to channel a lot of the energy they had in anticipation of summer break. Several groups that had been chatty and overactive during other cases were in fact very diligent in working on their posters, and the results reflected that effort. Also, with this poster assignment as well as all of the previous poster assignments, the students made all of the poster components on separate sheets of paper and taped or stapled those components onto tri-folding cardboard poster boards that we had been using and reusing all year.

### *Things that could have gone better:*

- Time management. As is typical of case implementation, it is very easy for time to slip by, especially during a time of year when the number of random assemblies, rallies and standardized tests increases as student attention spans diminishes. However, by this time of the year students were used to case formats and knew that they needed to finish up at home anything that was not completed in class.
- Keeping students on task! As mentioned, this was at the very end of the school year, and students were excited about the warmer weather and their upcoming summer vacation. It was therefore much harder to keep them on task than in earlier cases despite their interest in the scenes and their enjoyment in making their posters, and more difficult to transition students from group work to whole-class discussion and from classroom to computer lab. Perhaps additional hand-on activities prior to the

poster product would help with this (a great idea would be a diorama of a house or apartment that includes simple circuit lights, which was part of a Year 1 PRISM case written by Molly Embree and Amy Webb).

## Resources

Assembling the most useful of the following online sources as links on a webpage that the students can access in the computer lab or at home is a very efficient way to structure group or independent research. Also, the students should be encouraged to utilize their textbooks or other resources. These are some helpful resources; a selection of these was included on the “Crisis in the ATL!” page of the PRISM Web site ([http://www.prism.emory.edu/columbia\\_middle](http://www.prism.emory.edu/columbia_middle))

### The Basics of Electricity:

Energy Information Administration. (2004). Electricity – A secondary energy source. Retrieved February 19, 2006 from <http://www.eia.doe.gov/kids/energyfacts/sources/electricity.html>

HowStuffWorks, Inc. (2004). How power grids work. Retrieved February 19, 2006 from <http://science.howstuffworks.com/power.htm>

### Air Conditioners??

City of Loveland, CO (2000) AC Drives Electricity Costs Up. Retrieved February 19, 2006 from [http://www.ci.loveland.co.us/wp/Electric\\_Utility/Peak/acuse1.htm](http://www.ci.loveland.co.us/wp/Electric_Utility/Peak/acuse1.htm)

HowStuffWorks, Inc (2004) How Batteries Work. Retrieved February 19, 2006 from <http://science.howstuffworks.com/battery.htm>

### Crisis in Metro New York!

BBC News (2003) Blackouts cause N America chaos. Retrieved February 19, 2006 from <http://news.bbc.co.uk/1/hi/world/americas/3152451.stm>