

POWERUP LESSON 6: ENERGY RESEARCH PROJECT WITH LOCAL FOCUS



PowerUp Lesson Plan Overview

This lesson is one of six lessons developed as a classroom companion to PowerUp, a free, online, educational video game that allows students to experience the excitement and the diversity of modern engineering.

The lessons are designed to be flexible and scalable to meet your students' needs. Facilitation tips, extension activities and resources for learning more can be found in the Teachers' Guide, which is available for download along with each of the lessons. For these resources, as well as to download and play PowerUp for free, go to <http://powerupthegame.org>.

PowerUp was created by IBM and TryScience/The New York Hall of Science with scientific content and expertise provided by the Tech Museum of Innovation, the Bakken Museum, Idaho National Laboratory and the National Renewable Energy Laboratory.

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Through playing PowerUp and working on the activities in these lessons your students have learned about a variety of renewable resources that are being harnessed for energy in a range of settings. Your students have seen that although these new technologies benefit society by generating electricity free of carbon dioxide and other harmful emissions, implementing them can sometimes be quite controversial!

This culminating project is all about your own local community: What are the energy issues that matter most to your students, their friends, families and neighbors, how are local Engineers solving these problems? What innovative solutions can your students design?

STUDENT OBJECTIVES

Students work in groups to brainstorm lists of the energy issues that they think are most important to the local community. Groups create and distribute questionnaires to local community members (including, where appropriate elected officials and community leaders) to gauge community concern over issues. Groups pick one of issues identified as important to the local community to be the focus of their research.

Students learn as much as they can about the issue – what is it all about? Is there any controversy surrounding it? If so, students should make sure to learn about each opposing side of the issue. Students may conduct research by reading books or newspaper articles, in a library or on the Internet, and by interviewing local community members and experts on the topic.

Students reach out to local engineers to learn how engineers are working to solve this problem. Students may interview engineers and record audio or video, or transcribe answers, or they may email questions and answers to engineers.

Finally students will brainstorm, design, and sketch their own solutions to the energy issue, based on research through books, articles and web resources and input from the community and engineering experts.

Students will create a presentation – presentations can take any form from a 3-panel poster board to a multimedia website – that explains the following:

- Describe the issue
- How does the issue impact the community and the local ecology?
- Has the issue been a community priority for a long time or has it recently become important?
- Are there any proposed solutions?
- Is there disagreement or controversy about the issue; about the solutions?
- How are Engineers in the community working to develop a solution?
- What are your group's ideas for a solution?
- How does your solution take into account community concerns?
- How would your solution impact the local ecology?
- Explain how your research influenced your design

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TIPS FOR CONNECTING STUDENTS WITH LOCAL ENGINEERS

- To help find engineers who are willing to discuss their work with your students, reach out to local Universities with Engineering Departments, local offices of State, federal and local environmental protection agencies such as the EPA.
- Reach out to the local chapters of professional engineering associations, a list of these, and the URLs for their websites can be found in the Resources Section of the Teachers' Guide.
- There are many engineers in industry, and many large companies have volunteer programs – contact the human resources representative of local companies and inquire.

NATIONAL SCIENCE STANDARDS 9-12

NS.9-12.4 Earth and Space Science

As a result of activities in grades 9-12, all students should develop understanding of:

- Energy in the earth system

NS.9-12.5 Science and Technology

As a result of activities in grades 9-12, all students should develop understanding of:

- Understandings about Science and technology

NS.9-12.6 Personal and Social Perspectives

As a result of activities in grades 9-12, all students should develop understanding of:

- Natural Resources
- Environmental quality
- Natural and human-induced hazards
- Science and technology in local, national and global challenges

NS.9-12.7 History and Nature of Science

As a result of activities in grades 9-12, all students should develop understanding of:

- Science as a human endeavor
- Nature of scientific knowledge
- Historical perspectives

CLASSROOM – GAME CONNECTIONS

Teachers are encouraged to submit your students' digital presentations to be published on the web. Learn more at: www.powerupthegame.org

Student work that does not conform to the [TryScience.org publishing guidelines](#) will not be published.

TryScience.org Publishing Guidelines

In order to publish students' or teachers' work on TryScience.org all of the following conditions must be met:



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- 1- Projects must comply with all state, federal, and international laws concerning copyright, intellectual property rights, and legal uses of network computers.
- 2- Students should refrain from using copyrighted materials including music, video clips, and text. If any copyrighted materials **are** incorporated, projects must indicate that rights and permissions have been secured.
- 3- Projects must not display personally identifiable images of students or any other minors nor display any other personally identifiable information of students or other minors such as last names, addresses, phone numbers, email addresses or IM or social network site screen names.
- 4- If any personally identifiable images of adults are incorporated into presentations projects must indicate that rights and permissions have been secured.”