

**Grade 6
Science
Unit 7: Energy Use and Renewal**

Time Frame: Approximately three weeks



Unit Description

This unit introduces the real-world applications of energy use and renewal, with special emphasis on the varied sources from which our energy comes. Environmental and social questions concerning energy use and overuse of selected energy forms and sources will be the main focus of this unit.

Student Understandings

The focus of this unit is on sources, use, and renewal of energy. An understanding of the potential as well as the detrimental effects of overuse of selected forms of energy overlaps with environmental studies and social studies. Public information brochures, science fair projects, or case studies involving decision-making questions would be different ways to approach these understandings.

Guiding Questions

1. Can students identify the sources of energy used in our society that allow it to function in its present state?
2. Can students tell how these sources of energy are used in our society?
3. Can students classify renewable and nonrenewable energy sources?
4. Can students determine who is affected by overuse of selected energy sources?
5. Can students explain potential environmental effects involved in the overuse of selected sources of energy?

Unit 7 Grade-Level Expectations (GLEs)

GLE #	GLE Text and Benchmarks
Science as Inquiry	
<i>Note: The following Science as Inquiry GLEs are embedded in the suggested activities for this unit. Other activities incorporated by teachers may result in additional SI GLEs being addressed during instruction.</i>	
3.	Use a variety of sources to answer questions (SI-M-A1)
19.	Communicate ideas in a variety of ways (e.g., symbols, illustrations, graphs, charts, spreadsheets, concept maps, oral and written words, equations) (SI-M-A7)

GLE #	GLE Text and Benchmarks
25.	Compare and critique scientific investigations (SI-M-B1)
37.	Critique and analyze their own work and the work of others (SI-M-B5)
38.	Explain that, through the use of scientific processes and knowledge, people can solve problems, make decisions, and form new ideas (SI-M-B6)
39.	Identify areas in which technology has changed human lives (e.g., transportation, communication, geographic information systems, DNA fingerprinting) (SI-M-B7)
40.	Evaluate the impact of research on scientific thought, society, and the environment (SI-M-B7)
Physical Science	
39.	Describe how electricity can be produced by other types of energy (e.g., magnetism, solar, mechanical)
41.	Identify risks associated with the production and use of coal, petroleum, hydroelectricity, nuclear energy, and other energy forms (PS-M-C8)
Science and the Environment	
42.	Identify energy types from their source to their use, determine if the type is renewable, nonrenewable, or inexhaustible, and explain how these types affect the environment and economy (SE-M-A6)
43.	Explain how the use of different energy resources affects the environment and the economy (SE-M-A6)
44.	Explain how an inexhaustible resource can be harnessed for energy production (SE-M-A6)
45.	Describe methods for sustaining renewable resources (SE-M-A6)
46.	Identify ways people can reuse, recycle, and reduce the use of resources to improve and protect the quality of life (SE-M-A6)
47.	Illustrate how various technologies influence resource use in an ecosystem (e.g., forestry management, soil conservation, fishery improvement) (SE-M-A8)

Sample Activities

This unit requires students to gather information and resources in order to collaborate for a group oral presentation and visual presentation.

Assign a deadline each week for the different steps required to complete this project so that students may pace themselves and complete each task in a thorough manner.

Week One: Establish 8 Teams: All students conduct research on the selected team topic (draw for topic)

Week Two: Energy teams pool all information and collaborate to present their energy viewpoint, teams work on energy brochure or tri-fold

Week Three: Energy Brochure/Tri-fold presented and oral presentations by teams

This unit requires frequent, extensive monitoring to assure that all students are developing skills and knowledge to meet the targeted GLEs. Teachers should promote student questions throughout the evolution of the project. A checklist for the culminating oral presentation and brochure should be presented or constructed with the assistance of the teams so that all students

are focused on a quality final product. Throughout the time frame devoted to this project, the teacher may choose to add energy games and other learning activities to the classroom agenda. Locate websites for games and activities that may include the construction of models employing solar power, wind power, batteries, or water power.

Activity 1: Creation of Energy Research Teams (SI GLEs: 3, 37, 38, 39, 40; PS GLEs: 39, 41; SE GLEs 42, 43, 44, 45, 46, 47)

Materials List: eight cards from which teams will draw their topic (solar, water, wind, oil/natural gas, biomass, coal, geothermal, nuclear), one copy of the Presentation Job List BLM for each team, Internet access, resources for student use

Eight teams need to be assembled. These student teams will then draw from cards labeled to represent the following energy sources: solar, water, wind, oil/natural gas, biomass, coal, geothermal, and nuclear. All teams will use the Presentation Job List BLM to identify each team member's responsibilities in researching the key points and in following the project guidelines.

Students will research the topic selected so as to address these key points:

- Can you identify source of the energy form?
- Is it considered renewable, nonrenewable, or inexhaustible?
- How is this energy source utilized for communities, etc?
- What are the risks associated with the production of this energy source?
- What are the risks associated with the use of this energy source?
- Are there any environmental concerns?
- If inexhaustible, how is it harnessed for energy?
- If renewable, how is it maintained or sustained?
- What programs of reducing, reusing, and recycling support this resource?
- How do various technologies or practices influence the use of this resource?
- What industries rely on this energy source?
- Who are the primary consumers?
- Describe Louisiana's use of this resource and what determines our dependency on or "non-use" of this resource.

The Presentation Job List BLM is provided for each team so that all *key points* will be covered in the research and all team members contribute.

Suggested guidelines for the research project should include the following:

- establish and maintain a team science *learning log* ([view literacy strategy descriptions](#)) to reflect the on-going research that is used to prepare for the presentation
- teacher observation of the ongoing process
- use of at least 4 sources of information: 2 Internet (must be reliable source, as determined by the teacher), and 2 from printed media
- a tri-fold brochure used to gain public support for that energy source.

- an optional, personal interview with a pre-approved individual could be added for “bonus points”
- a timeline to assure all team members are ready for the collaboration process
- an oral presentation, in the guise of an infomercial, to present the information gathered to the class, while the *audience* listens for information, accuracy and understanding (class members, as the audience, may ask clarifying questions)
- grammar and spelling must be considered in the final products

Activity 2: The Brochure (SI GLEs: 3, 19, 38, 39, 40; PS GLEs: 39, 41; SE GLEs: 42, 43, 44, 45, 46, 47)

Material List: Presentation Job List BLM for each group, *Microsoft Publisher*® (optional), paper for brochure as needed

Microsoft Publisher® offers templates for informational brochures. Provide samples of various tri-fold brochures so students can visualize how their topic should be presented. For classes without computer access, the brochure can be assembled with hand-printed text and collected graphics. Students should focus on presenting information in a manner that is easy to read, offers a logical flow of information, and is appealing to the eye. They may create a large version so that adding text will be easier.

Students will use *RAFT writing* ([view literacy strategy descriptions](#)) to project themselves into the role of Energy Sales Teams so as to look at the use of energy from a unique perspective. Their audience will be community leaders shopping for an energy source for a new town being planned. The form the writing will take is a tri-fold brochure on energy sources to be presented in an infomercial. The topic will be determined by the energy source card drawn.

The team members should meet and pool all information collected on a regular basis. The key points that should be addressed in each project (job list) should be revisited to make sure that all information has been gathered. The first presentation of information will be in the form of the tri-fold. The tri-fold will be two-sided and the cover should contain the title of the energy source.

All points will be addressed in the tri-fold, and graphics will be utilized to give the project appeal. Student teams must keep a science *learning log* ([view literacy strategy descriptions](#)) that reflects the contributions of each member, as well as the action plan for accomplishing the task and a record of research. Student teams should make certain all *key points* are well-covered in the tri-fold brochure. Use the Presentation Job List to verify that all goals are being met and that all members are fulfilling their responsibilities for the project. Teams will work together to plan the layout and discuss the information collected.

Activity 3: Oral Presentation (SI GLEs: 19, 25, 37, 38, 39; PS GLEs: 39, 41; SE GLEs: 42, 43, 44, 45, 46, 47)

Materials List: Oral Presentation Peer Evaluation Rubric BLM for *each* student to use for *each* team, one presentation rubric for teacher use for each team presenting, visual or prompts as indicated by the teams (provided by the teams)

Each team will use a Oral Presentation Peer Evaluation Rubric BLM to score the oral energy presentations for the other groups. An alternative peer evaluation for oral presentations is available online at http://www-ed.fnal.gov/help/kuhrt/student/energy_rubric1.html or at other oral presentation rubric sites. The checklist of all points that are covered well by the presenting group should be utilized by the observers and will serve as an indication of the effectiveness of the presentation and research.

Students will give their energy source presentation as a group in 6-10 minutes. The use of visuals is encouraged. Students may select to use an “infomercial” format.

The following points should be included in the rubric:

- All information was presented in an interesting and memorable manner.
- All members of the team shared in the presentation.
- Keys points were made on energy source use: risks, benefits, and whether or not it is renewable, nonrenewable, inexhaustible.
- Students appeared knowledgeable and confident with the information.
- Students presented accurate and thorough information about their energy source.
- Students were able to present a persuasive presentation in a concise, effective manner.

This topic may be appropriate for use in a science fair or energy fair, which would provide an alternative venue for this research and presentation format.

Sample Assessments

General Guidelines

Assessment will be based on teacher observation/checklist notes of student participation in unit activities, the extent of successful accomplishment of tasks, and the degree of accuracy of oral and written descriptions/responses. Journal entries provide reflective assessment of class discussions and laboratory experiences. Performance-based assessment should be used to evaluate inquiry and laboratory skills. All student-generated work, such as drawings, data collection charts, models, etc., may be incorporated into a portfolio assessment system.

- Students should be monitored throughout the work on all activities.
- All student-developed products should be evaluated as the unit continues.
- When possible, students should assist in developing any rubrics that will be used and have copies of the rubrics during task directions.
- Student work should reflect an ongoing process as opposed to an overnight creation.

General Assessments

- Teams will present information, in written and oral format that shows understanding of the energy source.
- Teams will utilize a peer evaluation form when listening to the presentations of other groups.
- Teams will present compelling evidence of energy risks, benefits, uses, and other current information from a variety of sources.
- Each student will demonstrate participation in team project.

Activity-Specific Assessments

- Activity 1: Students' evidence of research and organization of information reflects an understanding of the topic and the project goals. Energy facts collected will provide a basis for an educational, informative presentation. Team learning log entries will reflect all research, responsibilities of each team member, and the processes used to assemble for delivery.
- Activity 2: Deliverable is a hard copy of a finished tri-fold brochure that adheres to the guidelines set and reflects the key points outlined at the start of the project. Key points are addressed thoroughly and provide usable information relative to studying the origin, benefits, and drawbacks of the selected energy source. Student log reflects active participation by all members in the planning process for the brochure. The teacher observes all team members contributing to the project. Any information lacking for the brochure could be added for the oral presentation. A completed job list should provide additional evidence of each team member's contributions during the process. Teamwork rubric templates are available online. See a rubric, such as those at <http://www.uwstout.edu/soe/profdev/rubrics.shtml> for team member self-assessment.
- Activity 3: Energy Sales Teams will present their oral presentation or "infomercial." Presenters should be well informed with key points thoroughly addressed during the presentation, with the idea of influencing public opinion to gain support for their energy source as the preferred source for the newly planned community. All students should be knowledgeable about the team energy source and this will be evident by their participation in presenting support for the key points during the presentation or during the peer review afterwards. Peer Evaluation Rubric BLM will be used for each team presentation by the audience (remaining teams).

Resources

- For explanation of energy terms, online at <http://www.eia.doe.gov/kids/energyfacts/science/formsofenergy.html>
- Also useful for terminology online at <http://www.energyquest.ca.gov/indhtml>
- Additional peer oral presentation rubric is online at <http://serc.carleton.edu/introgeo/campusbased/presentation.html>
- Energy stories for many of the energy sources online at <http://www.energyquest.ca.gov/story/chapter08.html>
- Coal info available online at <http://energy.usgs.gov/coal.html>
- Biomass energy info available online at <http://www.nrel.gov/rredc/>
- Wind power information available online http://www.eere.energy.gov/windandhydro/windpoweringamerica/wind_maps.asp, <http://www.geology.wisc.edu/geo411/hasselman.html> and <http://www.eere.energy.gov/RE/wind.html>
- *Fossil Fuels Quiz* available online at <http://www.ecokidsonline.com>
- *Energy Education Resources*. Available online at www.eia.doe.gov/kids/onlineresources.html