

## FORMS OF ENERGY – LESSON PLAN 2.4

# Chemical Energy

This lesson is designed for 3rd – 5th grade students in a variety of school settings (public, private, STEM schools, and home schools) in the seven states served by local power companies and the Tennessee Valley Authority. Community groups (Scouts, 4-H, after school programs, and others) are encouraged to use it as well. This is one lesson from a three-part series designed to give students an age-appropriate, informed view of energy. As their understanding of energy grows, it will enable them to make informed decisions as good citizens or civic leaders.

This lesson plan is suitable for all types of educational settings. Each lesson can be adapted to meet a variety of class sizes, student skill levels, and time requirements.

### Public School System Teaching Standards Covered

#### State Science Standards

- TN SPI 0407.10.1 and WCS 4<sup>th</sup>

#### Common Core Language Arts/Reading

- ELA.CCSS.W.4.1 4<sup>th</sup>

Setting	Lesson Plan Selections Recommended for Use
Smaller class size, higher student ability, and /or longer class length	<ul style="list-style-type: none"> <li>• The “Modeling” Section contains teaching content.</li> <li>• While in class, students can do “Guided Practice,” complete the “Recommended Item(s)” and any additional guided practice items the teacher might select from “Other Resources.”</li> <li>• NOTE: Some lesson plans do and some do not contain “Other Resources.”</li> <li>• At home or on their own in class, students can do “Independent Practice,” complete the “Recommended Item(s)” and any additional independent practice items the teacher selects from “Other Resources” (if provided in the plan).</li> </ul>
Average class size, student ability, and class length	<ul style="list-style-type: none"> <li>• The “Modeling” Section contains teaching content.</li> <li>• While in class, students complete “Recommended Item(s)” from “Guided Practice” section.</li> <li>• At home or on their own in class, students complete “Recommended Item(s)” from “Independent Practice” section.</li> </ul>
Larger class size, lower student ability, and/or shorter class length	<ul style="list-style-type: none"> <li>• The “Modeling” Section contains teaching content.</li> <li>• At home or on their own in class, students complete “Recommended Item(s)” from “Independent Practice” section.</li> </ul>

**Electrical Safety Reminder:** Teachers should remind students that electricity is dangerous and that an adult should be present when any recommended activities or worksheets are being completed at home. Always obey instructions on warning labels and ensure one has dry hands when touching electronics or appliances.

## Performance Objectives

By the end of this lesson, students will be able to:

- Distinguish between chemical energy and other forms of energy.
- Identify chemical energy.
- List the forms of chemical energy.

## I. Anticipatory Set (Attention Grabber)

### ? Essential Question

What is chemical energy and how is it used?

### 📺 Videos

What is Chemical Energy? Video: <http://www.eschooltoday.com/energy/kinds-of-energy/what-is-chemical-energy.html>

## II. Modeling (Concepts to Teach)

**Chemical energy** is the energy **stored** in the bonds found in molecules. It is an example of potential energy. When food is eaten, the body breaks down these molecules and the stored energy is used for the body to do work, like walking, talking, and thinking. Every molecule stores energy in its chemical bonds. Wood, natural gas, coal, and other molecules can be broken down in the process of combustion, and during this process, energy is released. That energy is then used to heat homes, to generate electricity to run appliances, and to provide light for homes at night.

Absolutely everything around, both living and non-living, natural and altered, is made of chemical molecules of one kind or another that formed from chemical reactions.

## III. Checking for Understanding

Teachers can ask students these questions to determine understanding of concepts.

<b>REMEMBER</b>	List the characteristics of chemical energy. (Class discussion)
<b>UNDERSTAND</b>	What can chemical energy be used for? (Class discussion. Answer: Many energy sources commonly used by humans are forms of chemical energy. They are usually labeled “fuels.” The way to use the chemical energy in most fuels is by burning them, as we do with wood, natural gas, gasoline, coal, and others. When these fuels burn, they give off heat.)
<b>APPLY</b>	What happens when dynamite explodes? What is the chemical energy converted into? (Class discussion. Answer: When dynamite explodes, its chemical energy changes very quickly into thermal and radiant (light) energy and transfers from a potential state to a kinetic state.)
<b>ANALYZE</b>	Compare chemical energy to mechanical energy. (Class discussion)

## IV. Guided Practice Ideas

### Recommended Items

**Battery Life Experiment and Peanut Power Experiment (see below)**

### Experiments

- Battery Life Experiment – stored chemical energy: <http://www.energyquest.ca.gov/projects/battery.html>
- Peanut Power Experiment: <http://www.energyquest.ca.gov/projects/peanut.html>
- Chemical Energy in a Bottle Experiment: <http://www.education.com/science-fair/article/chemical-potential-energy/>

## V. Independent Practice Ideas

### Recommended Items

- **Venn diagram:** Comparing forms of energy (see below)
- **Create a list:** List examples of items that use chemical energy (ex. Batteries, gasoline, etc.) (see below)

### Personal Practice

- Venn diagram: Teachers ask students to compare chemical energy with their choice of another form of energy using a Venn diagram. (Ex. Draw two large intersecting circles. Label one circle chemical energy and the other circle another energy, such as mechanical).  
[http://www.learninggamesforkids.com/graphic\\_organizers/writing/venn-diagram.html](http://www.learninggamesforkids.com/graphic_organizers/writing/venn-diagram.html)
- Create a list: Teachers write the following question on the board and ask students to copy the question and list examples on a sheet of paper: List examples of items that use chemical energy (Ex. Batteries, gasoline, etc.)
- Journal (if the students have a journal). Teachers write the following questions on the board and ask students to copy and answer the questions in their journals: What did you learn about chemical energy? Chemical energy can do...

### Practice That May Involve Parents or Guardians

- At-home Checklist: Teachers write the following question on the board and ask students to copy it on a sheet of paper. At home, students find different kinds of chemical energy and list them on the paper. What kinds of chemical energy are in your home?

## VI. Assessment

These items provide a check for understanding so teachers can easily determine whether concepts need to be reinforced. These items can be graded, if desired.

- Venn diagram (if completed as Independent Practice, as shown above)
- Create a list (if completed as Independent Practice, as shown above)
- Journal (if completed as Independent Practice, as shown above)
- This lesson plan doesn't include a worksheet.



## VII. Materials Needed

The following materials are needed for the **Battery Life Experiment** in “Recommended Items” in the Guided Practice section.

- Four of the same type, size and brand flashlights
- Two D-size batteries from each of the following brands: Duracell, Energizer, Eveready and Rayovac
- Two other D-size batteries to test each flashlight and bulb before starting tests

## VIII. Closing the Lesson

In addition to the Essential Question shown below, teachers can reference Performance Objectives at the top of the Lesson Plan.

### Essential Question

**What is chemical energy and how is it used?**