

## INSPIRE GK12 Lesson Plan



<b>Lesson Title</b>	Energy: Non-Renewables, Renewables, and Conservation
<b>Length of Lesson</b>	One (50 minute) class period
<b>Created By</b>	Calista Guthrie
<b>Subject</b>	Earth Science
<b>Grade Level</b>	8 <sup>th</sup> grade
<b>State Standards</b>	8 <sup>th</sup> : 1b, 1c, 1f, (Inquiry); 2d, (Physical Science); 4d, (Earth Science)
<b>DOK Level</b>	DOK2, DOK 3
<b>DOK Application</b>	Categorize, Construct, Cause/Effect, Context Clues, Interpret, Investigate, Compare, Formulate, Explain Phenomena in Terms of Concepts
<b>National Standards</b>	5-8: A (Inquiry); B (Physical Science); D (Earth/Space)
<b>Graduate Research Element</b>	From marsh to coal. Students will get to make a model of the potential life of a coal bed from deposition, as a marsh, to mining, to burning for electricity.

### **Student Learning Goal:**

#### MS 8th Grade:

1(b) Make inferences based on observations 1(c) Make quantitative and qualitative observations to make the connection of heat, power, and pollution 1(f) Develop an argument for why there is no perfect solution to energy crisis 2(d) Understand how energy is generated in a power plant. 4(d) Research the importance of conservation of renewable and nonrenewable resources.

#### National Science Education Standards of Content 5-8:

A: Inquiry: Understandings about scientific inquiry; Students will become acquainted with different energy resources.

B: Physical Science: Transfer of Energy; Students will explore how different types of energy are converted into resources that we use to generate electricity.

D: Earth and Space Science: Structure of the Earth's System; Students will learn about different energy resources and discuss how they all are all a form of solar energy.

### **Materials Needed (supplies, hand-outs, resources):**

“How Coal Works” from Energy Flows (see Teacher Resources), instructions for making the coal model, at least five dessert layers; two lamps, incandescent light bulb and equivalent energy efficient light bulb, electric meter, and the Its Electric worksheet (INSPIRE\_Guthrie\_02.01.12\_Handout); Matching game from Energy Flows (see Teacher Resources); School House Rock “Energy Blues” and “Electricity” videos (see Teacher Resources).



**Lesson Performance Task/Assessment:**

This is a lab introducing energy. To begin class, show the video “Energy Blues.” The instructor should engage the students in identifying different forms of energy they have used today. Before breaking the students into groups the instructor will give a brief overview of how class will be conducted. The “It’s Electric” worksheet (INSPIRE\_Guthrie\_02.01.12\_Handout) should be placed at the electric station and should be collected at the end of class. The instructions for “Marsh to Coal” (INSPIRE\_Guthrie\_02.01.12\_Handout) for the appropriate group number as well as “How Coal Works” (See Energy Flows in Teaching Resources) should be placed at the coal station.

**Lesson Relevance to Performance Task and Students:**

The capture activity for this lesson is teaching with food and using technology to determine electrical consumption of common household appliances. This lab is a great introduction to different energy resources, how fuels are formed, and their different uses. Students will mathematically determine the amount of pollution that can be avoided by replacing one incandescent light bulb with an energy efficient light bulb. It should be pointed out to students that there are trade-offs for efficiency (i.e. mercury in efficient light bulbs) and for renewable energy sources (reservoirs are sediment traps, wind mills make noise and visual pollution, etc.)

**Anticipatory Set/Capture Interest:**

The capture activity for this lab is the “Energy Blues” video shown at the beginning of class as well as getting to eat at the end of class. The instructor will explain the flow of the lab, students get to be interactive the whole class period, and hopefully they can learn from each other as they work in groups to complete the tasks assigned to them.

**Guided Practice:**

Students will listen as expectations for the lab are explained to them. They will receive different instructions as they move from station to station, with each station exploring a different aspect of energy resources and how we use them. At the coal station, before touching any of the food, students will be prompted to discuss how coal is formed and get to observe samples of coal. It should be explained to each group what previous groups did and what the next groups will do. At the electric station, they will receive the Its Electric handout (INSPIRE\_Guthrie\_02.01.12\_Handout) and the electric meter will be explained. At the matching game station, students will discuss different terms and definitions that they are trying to match. As they debate amongst themselves, they will be learning how different forms of energy may be used. At the end of class they will be prompted to discuss renewable and non-renewable resources.

**Independent Practice:**

Students will be expected to stay on task, reading and following directions as they go through the lab rotation. Though they will be doing rotations in groups, they should



make their own inferences based on what they are expected to do at each station. Students should complete the electric worksheet individually.

**Remediation and/or Enrichment:**

Remediation – Individual IEP

Enrichment- Students could be asked to get the reading on their power meter at home on Monday and Friday to see how much energy their family used for the week.

**Check(s) for Understanding:**

As students are going through their stations, ask them questions about what they are doing and why. For the coal station, be sure they understand the concept of millions of years. At the electric station be sure they consider the appliances that are plugged-in in their homes. Did they leave the light, TV, radio, video game on when they left for school this morning? For the matching station, be sure they are using context clues. Yes, a wind turbine harnesses wind energy but does it use that energy to float across the water? Try again.

**Closure:**

Show “Electricity” (see Teacher Resources)

Ask students questions.

Question 1: How does electricity work? (Keywords: generator, burning fuels, wind, etc.)

Question 2: What does it mean for a resource to be non-renewable? Discuss the non-renewable energy resources.

Question 3: What does it mean for a resource to be renewable? Discuss forms of renewable energy and their feasibility for replacing non-renewables.

**Possible Alternate Subject Integrations:**

Math, Physical Science, Life Science

**Teacher Notes**

Station Set-up:

Station 1- Matching Game

Station 2- How coal is formed with hand out (Each group that passes through does a different thing with the marsh as noted in hand out); before the first group begins be sure to show the “pristine” marsh to the class and at the end of class discuss what each group did and show the “reclaimed area” to the class.

Station 3- Light bulbs, thermometers, voltmeter and electric appliances (have half of the group do the light bulb part and half do the voltmeter readings and trade halfway through the station time)

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### **Resources:**

Energy Flows

<http://www.need.org/needpdf/Energy%20Flows.pdf>

School House Rock: Energy Blues

<http://www.youtube.com/watch?v=qViYAaGAmRo&feature=related>

School House Rock: Electricity

<http://www.youtube.com/watch?NR=1&feature=endscreen&v=CLp1zPVI2iM>