

PROJECT REPORT

Northern Wyoming Community College District / National Science Foundation
Summer Energy Education Program 2011

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TITLE

Energy Choices – Economic, Environmental and Security Impacts

SUMMARY

This lesson utilizes Chevron’s online simulation, Energyville™ (www.willyoujoinus.com/energyville/), the objective of which is to “provide enough power to meet the energy demands of a city with a population of 5.9 million people while keeping them prosperous, secure, and living in a clean environment”.

ENERGY CONTEXT

The energy decisions made today based on current lifestyles and the projected energy demands and costs will have implications, both foreseeable and unexpected, in the future.

ANTICIPATED TIME REQUIRED

This lesson will require:

- Engagement – 10 minutes
- Exploration – 60 minutes
- Elaboration – 15 minutes
- Summary – 5 minutes

INTENDED STUDENT LEVEL

This lesson will present learning activities and assessment activities to meet the learning objectives intended for students in grades 9 - 12.

ASSUMED PRIOR KNOWLEDGE

This lesson will assume that students know that

- that energy is provided by both renewable and nonrenewable resources
- that fossil fuels are a major type of nonrenewable energy, and
- that the use of renewable resources such as solar energy and wind is considered advantageous.

In addition, students will have prior knowledge in using a laptop computer to access the Internet.

LEARNING OBJECTIVES

PA Academic Standards for Science and Technology

- 3.1.12A Apply concepts of systems, subsystems, feedback and control to solve complex technological problems
- 3.1.12B Apply concepts of models as a method to predict and understand science and technology

PA Academic Standards for Environment and Ecology

- 4.2.12A Analyze the use of renewable and nonrenewable resources
- 4.2.12B Analyze factors affecting the availability of renewable and nonrenewable resources

MATERIALS

Working in pairs, each group needs:

- a laptop computer with Internet access
- a copy of the attached worksheet
- a writing implement

INTRODUCTION / MOTIVATION FOR STUDENTS

- What is the difference between renewable and nonrenewable resources?
- What does it mean to be green?

PROCEDURE

See attached worksheet

SAFETY ISSUES

None anticipated

TROUBLESHOOTING TIPS

Some of the vocabulary may be unfamiliar, so students will be encouraged to use the Internet to look up some terms if necessary. These terms will be compiled by the class for a word wall.

ASSESSMENT

Pre-Activity Assessment - *Energy Choices I.Q. Pre-Quiz* (see attached)

Activity Embedded Assessment – worksheet, “Welcome to Energyville” (see attached)

Post-Activity Assessment – *Energy Choices Post-Quiz* (see attached)

SUGGESTED EXTENSIONS

Students will have compared the implications of nonrenewable vs. renewable sources of energy and have come up with an implementation that comprises a combination of each type.

One possible extension might be to design a three-dimensional model that utilizes the power sources deemed to minimize the economic, environmental, and security impacts, *i.e.*, to design a “green city” from scratch - *à la* Greensburg, KS. (see attached rubric, “3D Model Rubric – Green City – Starting Over”)

So far, the focus has been on the utilization of various energy sources with little regard to how these energy raw materials are obtained. Another extension could take a look at this issue. For example, students could be assigned an energy source (biomass, coal, geothermal, hydropower, natural gas, nuclear, petroleum, solar, wind, or some emerging technology) and asked to produce a poster illustrating how the resource is obtained and implemented – a sort of cradle to grave look at each energy alternative. (see assignment sheet/rubric attached, “Energy Sources – Cradle to Grave”)