PROJECT REPORT

Northern Wyoming Community College District / National Science Foundation
Summer Energy Education Program 2012

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TITLE

Geology and Energy of Nonrenewable Resources.

SUMMARY

This unit will allow students to study a variety of nonrenewable energy resources and the geology in which they formed. For the majority of this unit the student does most of the work and the teacher takes the role of a coach. The teacher must set up the environment and then help assist students through the process. There are several sections to this unit, they are:

1. Introduction
2. Research and power point presentation.
3. Make a model of the geological strata.
4. Compare and contrast the different energy resources in terms of heat content and geologic structure.
5. Compare and contrast the different energy resources in terms of the impact to the geosphere, atmosphere, hydrosphere and biosphere.
6. Predict the type of resource that would be found in a “mystery” model.
7. Justification essay.

ENERGY CONTEXT

Energy is involved everywhere we look, but how does it really start? Several nonrenewable forms of energy will be highlighted such as coal, oil, and oil shale. The heat content provided by each resource will be studied. Students will also be reminded that energy can change forms, including the evolution of heat.

ANTICIPATED TIME REQUIRED

This project will require several 80 minutes class periods. I estimate it will take at least three weeks to complete this unit.

INTENDED STUDENT LEVEL

This project is intended for sophomores in high school. It could be adapted for other grades.

ASSUMED PRIOR KNOWLEDGE

- Distinguish between renewable and nonrenewable resources
- a basic understanding of igneous, sedimentary and metamorphic rock and the processes that form them.
- Foundational energy units, calories, kilowatts (power) and BTU
- Competent technology skills, in particular power point presentation.
- Competent research skills.

- Basic computational skills
- Group work etiquette
- The school rubric for the essay, science content rubric will follow
- The rubric for writing a laboratory report.

LEARNING OBJECTIVES

- integrate technology into a presentation
- compare and contrast nonrenewable resources
- apply concepts of models as a method to predict and understand science and technology
- use direct and indirect evidence to develop predictions of the type of energy associated with objects
- analyze factors affecting the availability of nonrenewable resources
- predict which nonrenewable resource will be found based on its geology
- compare and contrast nonrenewable energy sources
- understand the technology used to remove nonrenewable resources
- predict heat content values based of the geology of the resource
- use appropriate measurements, equations and graphs to gather, analyze and interpret data on the quantity of energy in a system
- identify different energy forms and the transformation of energy
- analyze the environmental and community impacts of a nonrenewable resource
- justify a solution based on the information

MATERIALS

Each group of two will need

- access to computers and internet
- muffins made by the teacher ---- see the introduction attachment
- cardboard or see through containers
- clay or homemade clay, at least 8 colors
- sand
- molasses
- straws
- basic building supplies
- plastic knives

INTRODUCTION / MOTIVATION FOR STUDENTS

See the document labeled Day 1. The activity with the muffins is intended to be an informal pre-assessment

PROCEDURE

Teacher procedure will be found in Day 2.
The handouts for students are labeled as:

- Geology
- Information from Presentations
- Rubric for power point, etc.

SAFETY ISSUES

General safety rules should be followed.

TROUBLESHOOTING TIPS

Be sure to have researched the mines or locations you are using. This unit will be most effective if you walk around and informally quiz students on their knowledge. Based on the behavior of the students determine if they need a different activity now and then, perhaps a video, or a discussion or a geology review.

ASSESSMENT

Pre-assessment is the first activity. It involves both informal assessment of the students' knowledge. See document 1

The more formal assessments will include the model of the geologic strata, and the lab report on the prediction strata, the power point presentation, and the final essay. All of these can be found in the attachments.

SUGGESTED EXTENSIONS

The project can go so many directions. You could bring in the regulations, or the economics of each resource.

The natural extension would be to look at a variety of careers in science.