

# PROJECT REPORT

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

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## TITLE

**Solving the 2012 Energy Crisis in Arlington Virginia**

## SUMMARY

This is a group project, based on a hypothetical situation that will have the student's research renewable and nonrenewable energy sources. The year is 2012. Fighting in the Middle East has stopped exports of much of the world's supply of crude oil. Congress has enacted legislation tasking all jurisdictions to immediately find alternatives to a minimum of 50% of the energy they need locally. This must include production facilities within the jurisdiction itself. Students will have to find a solution to Arlington's energy problem by forming a company which will supply energy to Arlington County. Student's companies should present a proposal and be prepared to answer questions from the Arlington County Board so they can make the best decision for the residents. Each companies CEO will hire their fellow students to complete the following jobs. Each company should have at least seven employees. CEO's might need to hire more workers depending on their business needs. There should be one person hired for each position. CEO: In charge of company operations. Needs to assess everyone's progress on a daily basis, and help out. CEO's will be helping the presenter present to the board. Designer: In charge of creating the Company Name, logo, slogan, and company directory of employees. Facilities: Map with facility including cost of land, cost of building, number of workers, output, cost per kilowatt of energy. Two Scientists: In charge of scientific report including resource distribution, mining techniques, geology and environmental impact report. Presenter: PowerPoint presentation of proposal including science report, facilities, design, pictures, coast and production. Company report writer: Company report, proposal in brochure form for your teacher. Architect: Construction of a 3-D model of facility or detailed architectural design drawing.

## ENERGY CONTEXT

### Virginia's Science Standards: Force, Motion, and Energy

6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include

- c) nonrenewable energy sources (fossil fuels including petroleum, natural gas, and coal);
- d) renewable energy sources (wood, wind, hydro, geothermal, tidal, and solar); and
- e) energy transformations (heat/light to mechanical, chemical, and electrical energy).

## ANTICIPATED TIME REQUIRED

This project will require about two weeks. Below is a sample timeline.

Day 1-4: You will have 4 class days to fill out the information card for your assigned job.

Day 5-7: Once you have your corrected information sheet returned, you will have three class days to work on your assigned product.. Your rough product is due at the end of day 7

Day 8: You will have one day to finalize your presentation and practice

Day 9: Present your proposal to the county board. Company brochures, science reports, maps, and self evaluations are due on Day 11.

Day 10: Class discussion and wrap-up. Conference worksheets and self evaluations are due tomorrow.

## INTENDED STUDENT LEVEL

This project will present learning activities and assessment activities intended for students in the 6th grade.

## ASSUMED PRIOR KNOWLEDGE

This project will assume that students have prior knowledge of:

- Basic mathematics
- Basic report writing/power point and brochure writing skills
- Group work etiquette
- Differences between kinetic and potential energy

## LEARNING OBJECTIVES

- Students will be able report on a renewable or non-renewable energy resource for Arlington County
- Students will be able to build a model their power plant
- Students will participate in a group discussion about available energy sources
- Students will self-evaluate their work
- Students will conclude which energy source will provide the best energy alternative based on availability and cost.
- Students will assess their energy needs
- Students will understand mining process and resource availability

## MATERIALS

- Resource books on different types of energy sources
- Construction paper, glue guns, cardboard, rulers for map drawing and model construction.
- Internet and computer lab
- **Student Handouts In Energy Folder Zip Drive INCLUDES:**
- Powerpoint Project Overview: Alternative Energy Project\_lil
- Research Worksheets for students in General Documents:
- energy\_information0001
- energy\_information0002
- Arlington Overview: For CEO
- Problem Worksheet, and Proposal Worksheet
- Information folders attached

## INTRODUCTION / MOTIVATION FOR STUDENTS

Power point with introduction is attached. The prompt for the students goes like this:

The year is 2012. Fighting in the Middle East has stopped exports of much of the world's supply of crude oil. Congress has enacted legislation tasking all jurisdictions to immediately find alternatives to a minimum of 50% of the energy they need locally. This must include production facilities within the jurisdiction itself. Your job is to find a solution to this problem by forming a company which will supply energy to Arlington County. Your company should present a proposal and be prepared to answer questions from the Arlington County Board so they can make the best decision for the residents.

## PROCEDURE

- Pick two students from each class to be your CEO's. Make sure these students are some of your brightest and nicest students. Pick one girl and one boy.
- Meet with the CEO's ahead of time and have them decide who they will "hire" for their company.
- Choose two students from each class to be part of the county board. They will need to do a little background research on each energy alternative. These worksheets are attached.
- Any student who doesn't get hired will have to complete an independent project on one type of energy source and present their project to the class. These worksheets are attached.
- Take one day to explain the hypothetical situation and develop your timeline.
- Contact parent/teacher volunteers to make up the remaining board member. You should have at least 6-9 board members.
- As students are working trouble shoot any problems they may face. CEO's need to "assess" their employee's on a daily basis. They can hire or fire as need be.
- Have materials ready for students presentations.
- Use attached rubric to assess work.
- After simulation is complete, led students in a class discussion on how simulation went, and the energy needs of different areas.

## SAFETY ISSUES

Computer safety and appropriate use.

## TROUBLESHOOTING TIPS

Have resources available for students to use. Make sure they understand the many pieces they will need to complete to finish project. Keep students on task.

## ASSESSMENT

### Pre-Activity Assessment

Question/Answer: Ask the students and discuss as a class:

- Where do we get energy to power our lights?
- How is this energy converted from one form to another?

### Activity Assessment

## Alternative Energy Evaluation

Category	4	3	2	1
<b>Presentation</b>	Well-rehearsed with smooth delivery that holds audience attention. Power Point includes all needed information for an informed decision.	Rehearsed with fairly smooth delivery that holds audience attention most of the time. Power Point contains all needed information for an informed decision.	Delivery not smooth, but able to maintain interest of the audience most of the time. Power Point missing some information needed to make an informed decision.	Delivery not smooth and audience attention often lost. Power Point is missing information needed to make an informed decision.
<b>Organization</b>	Science content is well organized within the context of the presentation. All content is clear, correct, and cited.	Science content is well organized within the context of the presentation. Most content is clear, correct, and cited.	Science content is somewhat organized within the context of the presentation. Most content is clear, and correct. Citations are missing.	Science content is not organized within the context of the presentation. Much of the information is unclear, incorrect, missing, and/or not cited.
<b>Originality</b>	Product shows a large amount of original thought. Ideas are creative and inventive.	Product shows some original thought. Work shows new ideas and insights in design.	Uses other people's ideas (giving them credit), but there is little evidence of original thinking and design. Design and proposal appear somewhat creative.	Uses other people's ideas, but does not give them credit. Design and proposal do not appear creative.
<b>Brochure</b>	Brochure contains comprehensive information about the energy source under consideration. Contains cost information and environmental impact report.	Brochure contains information about the energy source under consideration. Contains most cost information and some detail in the environmental impact report.	Brochure has minimal information about the energy source under consideration. Contains some cost information and vague detail in the environmental impact report.	Brochure is missing information about the energy source under consideration. Contains little to no cost information and little to no detail in the environmental

				impact report.
<b>Map</b>	Detailed map with facility and location.	Somewhat detailed map with facility and location.	Map with facility is not very detailed. Location information is vague.	Map does not contain much detail and/or location information is vague or missing.
<b>Model or Design Drawing</b>	3D model or design drawing is extremely detailed and contains all of the information needed to make an informed decision. Takes detailed costs and environmental impact into consideration.	3D model or design drawing is detailed and contains all of the information needed to make an informed decision. Takes detailed costs and environmental impact into consideration.	3D model or design drawing is not very detailed and does not contain all of the information needed to make an informed decision. Takes some costs and environmental impact into consideration.	3D model or design drawing is vague and does not contain information needed to make an informed decision. No costs and/or environmental impact are considered.
<b>Company Information</b>	All company information is present. Name, logo, slogan, and directory of employees, is clear, coherent, and easily identifiable.	All company information is present. For the most part, name, logo, slogan, and directory of employees, is clear, coherent, and easily identifiable.	Most company information is present. Name, logo, slogan, and directory of employees, may be somewhat unclear, incoherent, and/or unidentifiable.	Some company information is present. Name, logo, slogan, and directory of employees, may be somewhat unclear, incoherent, and/or unidentifiable.

### **Post-Activity Assessment**

*Question/Answer:* Ask the students and discuss as a class:

- Which energy sources are renewable and non-renewable?
- What are some pro's and con's of each type of energy?
- Where do the minerals to power these sources come from?
- Which choice do you feel is the best for Arlington?

### **SUGGESTED EXTENSIONS**

Visit a local power plant

Have a local miner or other power plant operator come talk to the students.

Invite an alternative energy worker to talk to the students

Share their energy projects with other students in other grade levels