



Title: Alternative Energy Exploration

Grades: High School

Time: 2+ weeks to conduct a feasibility study (cost/benefit analysis)

Objectives: In this project, students will determine the sources of energy that are utilized to power their schools (i.e., conventional and/or alternative). They will then explore the economic and environmental benefits of changing over a portion of this energy to renewable sources such as wind, solar, hydroelectric and geothermal. Depending on area-specific factors such as available funding ([funding by state](#)) and climate, this can involve the purchase of alternative energy credits and/or the creation of an on-site system such as a wind-turbine or solar panels.

Costs: Costs vary tremendously depending on the scale of the project and the project location. Most states offer various incentives and funding opportunities to assist in the creation of an alternative energy project. If it is executed properly, these projects can pay for themselves in as little as a few short years.

Background (Basics): According to the U.S. Department of Energy, *fossil fuels* – that is: coal, oil and natural gas – currently provide more than 85% of all the energy consumed in the United States, nearly two-thirds of our electricity, and virtually all of our transportation fuels. With recent events such as the well-publicized billion-gallon coal sludge spill in Eastern Tennessee, it comes as no surprise that these forms of energy production are very destructive to the environment. Thankfully, the federal government and most states have taken aggressive measures to assist towns, businesses and even home owners in the establishment of cleaner, renewable energy sources such as wind turbines and solar panels. Find programs in your state [here](#).

Learning Goals: The goal of this project is two-fold: for students to become aware of the sources/costs of energy used to power their schools, and for them to be able to present a strong case for the partial conversion of their school's energy supply over to renewable sources (based on economic, environmental, and educational arguments).

Materials Suggested: Calculators, recycled/scrap paper for record keeping and presentation, Microsoft PowerPoint.

Project Steps:

1. Learn about which sources of energy are used to power your school by consulting the website of your local utility company, or by contacting them via phone. If you don't know your local utility company, ask a school administrator (e.g., superintendent, principal, or teacher).

2. Find out rates for electricity (i.e., in \$ per kWh [kilowatt-hour]) in your area so that you can perform a cost-benefit analysis of an alternative energy project. You can find this information by contacting your utility company directly, or by speaking with the school official in charge of handling the bills.

3. Determine energy use of your school through one of a few methods. The easiest is to speak with the school official(s) in charge of handling the bills (direct this inquiry to your principal). The bills will list a breakdown of energy usage in kWh for gas, electricity, and other sources. If this is not a possibility, you can go about calculating approximate energy usage by using [Energy Cost Calculators \(U.S. Dept of Energy\)](#). **If an accurate calculation is to be made, this latter method is considerably more work-intensive, as it requires details of all electronic devices and heating systems, including model type and hours of use. It is more practical for rooms and manageable areas (e.g., cafeteria) than the entire school itself. **

4. Perform a cost-benefit analysis of various alternative energy projects (including, but not limited to, different wind-turbine and solar panel models) by evaluating the parameters listed below. It is important to note this list is not all-encompassing, and that some parameters may require consulting independent experts such as local meteorologists, alternative energy specialists, and zoning officials.



- *Location feasibility (e.g., is it typically sunny/overcast? windy/not?)*
- *Existent energy use & costs*
- *Projected energy generation (kW) of various models given location*
- *Costs of models (try [Windustry: Models & Costs](#) & [The Solar Guide](#))*
- *[Funding Opportunities In Your Area](#)*
- *Amount of time until savings $\geq$ project cost of project*
- *Other benefits (e.g., educational, environmental, etc.)*

NOTE: While performing the cost-benefit analysis of alternative energy projects is an informative and rewarding exercise, schools may want to consider hiring independent consultant firms to “officially” perform a detailed assessment of project feasibility. To understand why, and to gain greater insight into the scope of a typical feasibility study, students and teachers should review [Green School Design Feasibility Study](#). This is a representative feasibility study, as performed by the Eenergy International Corp. for the Athol High School in Athol, MA. It was funded by the Green Schools Initiative of the Renewable Energy Trust.

5. Decide on your strategy: After performing your cost-benefit analysis, how will you reach out to your target audience (e.g., superintendent, other school officials, students, teachers, the local community, etc.) to educate them about your findings? How will you persuade them to take action?

- Possible Strategies for the Campaign
 - *Run a school-wide campaign to educate your peers*
 - *Educate teachers and other school officials*
 - *Draft a petition in support of an alternative energy project and gather signatures in the school and local community; Present petition to school officials*
 - *Run a communitywide campaign*
 - *Organize a letter-writing campaign*
 - *Contact local news media and businesses to gather attention and support*
 - *Consider [Purchasing Renewable Energy Certificates \(RECs\)](#) whether or not an on-site project is feasible*
 - *Combine several of these strategies and run a Green Day at your school or come up with your own strategy.*

6. Set a goal and determine how you will **measure its success**.

- Example goal: MLK High School will gather 600 signatures on an Alternative Energy Support petition, and contact local news media to document our efforts in a school-wide rally to be held on February 8, 2009.
- Example measurement: We will record all names and signatures and tape the news coverage if it is not already available for download online.

7. Plan your Green Team Project: The following are some logistical questions to consider.

- Build a list of tasks and assign Green Team members to each one. The planning document should have various jobs listed: data gatherers, outreach coordinators, publicists, etc.
- Determine how you will communicate your plan to a target audience or audiences (i.e., email, cable announcements, school posters, flyers, e-flyers, etc.)
- Do you want to contact your local newspaper or other news media to place a story about your efforts?
- How will you effectively document and measure your success?
- Who will communicate with school administrators, custodians (if necessary), or other collaborators?



8. Implement your plan and take photos or videos of your program.

9. Report on your success by going to www.nationalgreenweek.com! Use this link to report your results and upload photos, videos, and art created through your Empty the Parking Lot Campaign.

Calculations:

Methodology for calculations will vary between schools and projects. Consult the two resources listed here for ideas on how to go about calculating energy usage, savings, and the amount of time until the project savings outweigh the cost of the project.

[Green School Design Feasibility Study](#)

[Example Calculations: How to Determine Energy Usage and Costs](#)



Questions:

What sources of energy are utilized to power your school? Does one or more source predominate?

What effects does the burning of fossil fuels have on the environment and/or public health? Provide as many specific examples as you can.

Describe the steps that were taken to educate and persuade your target audience of the benefits of using renewable energy in your school and/or community.

What factors favored the use of alternative energy in your school? What factors opposed it? Given these factors, do you feel that an on-site project, or the purchase of RECs is feasible in the near or somewhat-near future?



Resources

[Alternative Energy Guide](#) *contains lots of links on different forms of alternative energy, funding opportunities, contacts, and other resources

<http://www.dsireusa.org/> * the DSIRE website provides a fast and convenient method for accessing information about renewable energy and energy efficiency incentives and regulatory policies administered by federal and state agencies, utilities, and local organizations. Allow your state and federal government to help you set up a renewable energy project!



[Example Calculations: How to Determine Energy Usage and Costs](#)

[Purchasing Renewable Energy Certificates \(RECs\)](#) * can't afford to set up your own system? "Reduce what you can, Offset what you can't" with the purchase of Renewable Energy Certificates, also known as Renewable Energy Credits.

[State and Local Energy Efficiency Programs](#)

[K-12 Initiative](#) * a guide for teaching renewable energy, includes free posters and curriculum materials