Go Green! Designing an Eco Friendly Home
AP Environmental Science
Noblesville High School
Grades 11 & 12

Objectives
- To research different types of alternative energy
- To determine from Google satellite and topographic maps the best type of alternative energy to use in Noblesville, IN.
- To incorporate the knowledge of alternative energy to design an eco friendly home in Noblesville, IN.

Background Information
Students have been working on the energy and consumption unit in AP Environmental Science by College Board. This project was designed by me to serve as a wrap up of the unit to help students understand the fine balance between energy, sustainability and economics. Scaffolding activities include:
- Notes on conventional energy sources
- A class jigsaw on alternative energy sources
- Notes on solid and hazardous waste
- Suggested labs from APES Curriculum:
  - Molybdenum
  - Oil Spill
  - Cookie Mining
  - LC50 with Nitrates

Lab Team Size
Students will collaborate in teams of 3 to 4 to research and design an eco friendly home

Standard Alignment
Next Generation Science Standards
- HS-ESS3-2: Evaluate competing design solutions for developing, managing, and utilizing energy resources based upon cost-benefit ratios.
- HS-ESS3-4: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems

AP Environmental Science Standards
- Topic IV-D-1: Land and Water Use-Urban Land Development
- Topic V: Energy Resources and Consumption

Time Frame
- 2-3 90 minute blocks
  - The first one to two blocks are designated for student design and research of the eco friendly homes
  - The final block is designated for pitch presentations to the home builder (teacher) and class

Student Materials/Resources
- Internet access/resources
  - Google satellite images
  - www.homplans.com
  - Angie’s List
- iPad
Cost
$0.00

Scenario
My husband and I are building a new energy efficient home at 0 Hinkle Creek Road, Noblesville, IN (Google Map 0 Hinkle Creek Road and turn on the satellite imagery so you may see where our home will be) which is 2.5 miles west of Morse Reservoir. The home site is on 5.3 acres and is located in Fox Field Estates; we purchased the land for $89,000. We are looking for a (minimum) 2,000 square foot ranch style home with 4 bedrooms, 2.5 bathrooms, and basement (may be unfinished). Our budget is $450,000.

Your construction company’s goal is to meet not only our housing requirements, but using your knowledge of the geology, geography, and topography of my chosen home site, design the most eco-friendly home as possible. We are fully aware that we will be unable to have a completely green home for our price point but we want to do our part in sustaining the environment.

Your goal is to prepare a presentation that will be presented in class on __________________________.

The presentation must include the components:
- The name of your company, logo and slogan.
- A design plan meeting the buyer’s minimum needs
- The cost of the home without energy upgrades
- Proposed clean energy upgrades
- For each energy source chosen:
  - The cost to install the energy in the home
  - Any government incentives (tax rebates/credits)
  - Why the energy source was chosen based on group research (remember geography, geology and topography)
  - A contact list of local businesses or contractors that could be used in the project
- Mortgage Information
  - The current mortgage rate
  - The final cost of the house with the cost of the land, home and clean energy upgrades
  - Estimated monthly payment
- Any additional information you feel necessary to make me chose your company over another competitor

Happy home building!
<table>
<thead>
<tr>
<th>Criterion</th>
<th>Sophisticated</th>
<th>Competent</th>
<th>Inconsistent</th>
<th>Emerging</th>
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<tbody>
<tr>
<td><strong>EXPLANATION (x2)</strong></td>
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<tr>
<td>provide thorough accounts</td>
<td>provide an unusually thorough, elegant, or inventive account the eco friendly home design</td>
<td>provide an atypical and revealing account to explain decisions made regarding the eco friendly home design</td>
<td>reflect in-depth at some points but rely more unsupported personal opinions about the proposal of the eco friendly home design; the buyers may reject the proposal</td>
<td>provide a fragmented or sketchy account of our proposal home design</td>
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<td>support, verify, and justify our account by using a variety of types of evidence</td>
<td>support the point of view of scientific evidence</td>
<td>make connections between energy resources, sustainability and economics that reflect what we were thinking in our role as a construction company</td>
<td>provide insufficient or inadequate support by not having supporting data</td>
<td>rely on shallow generalizations, not evidence that our product is the best</td>
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<tr>
<td>demonstrate a deep as well as broad grasp of energy resources, sustainability and economics to a prospective buyer</td>
<td>make connections between energy resources, sustainability and economics that reflect what we were thinking in our role as a construction company</td>
<td>reflect in-depth at some points but rely more unsupported personal opinions about the proposal of the eco friendly home design; the buyers may reject the proposal</td>
<td>provide a fragmented or sketchy account of our proposal home design</td>
<td>rely on shallow generalizations, not evidence that our product is the best</td>
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<td><strong>APPLICATION (x3)</strong></td>
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<td>use knowledge effectively in a new situation and in many different contexts, adapt effectively in new situations and in many different context</td>
<td>use the science knowledge and skill set to solve a real world problem</td>
<td>use the science knowledge and skill set in a variety of appropriate and demanding contexts for this bid</td>
<td>respond with accurate vocabulary and skill set but rely on a limited set of tools as long as the situation is familiar</td>
<td>Can perform only under the guidance of the teacher who prompts with appropriate vocabulary and skill set</td>
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<tr>
<td>use the science knowledge and skill set to solve a real world problem</td>
<td>adjust the responses according to my audience to win the bid</td>
<td>adapt the responses according to my audience to have the ideas heard</td>
<td>require probing by the teacher when situation becomes intense</td>
<td>Can perform only under the guidance of the teacher who prompts with appropriate vocabulary and skill set</td>
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<td><strong>COMMUNICATION (x1)</strong></td>
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<td>communicates scientific knowledge and applications through writing, speech, or visual displays</td>
<td>presentation is appropriate for audience, is visually stimulating and has graphics, keeps audience engaged</td>
<td>presentation is appropriate for audience, is engaging and has good graphics</td>
<td>presentation has graphics, is somewhat appealing, and is appropriate for audience</td>
<td>presentation is disengaging, lacks graphics or visual interest</td>
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| Overall Score | 87-100% 24.5 points or higher | 75-86% 21 points or higher | 61-74% 17 points or higher | 60% and below 16.8 points or below |

Rubic modified from Noblesville High School Science UbD rubrics