Alternative Energy Design Challenge

Introduction

In 2016, the world total primary energy consumption was 572.8 quadrillion BTUs, with the United States consuming 17% of that, or 97.5 quadrillion BTUs (American Geosciences Institute, 2016). According to the U.S. Energy Information Administration (2017), 63% of the U.S.'s electricity was generated from fossil fuels, 20% from nuclear energy, and 17% from renewable sources. Each of these energy sources comes with its own environmental and economic costs and benefits. However, developing energy sources and energy consumption practices that are both economically and environmentally sustainable are critical to the improving and maintaining the health of the world's ecosystems.

In this lab, you will develop a model of alternative energy production that can be effectively implemented in the United States to help alleviate are dependency on unsustainable fuel sources. You will consider the location of energy generation and energy usage, model a functional energy source, assess its energy production, and analyze the sources effectiveness. Your research will culminate in a recommendation to the APES Energy Advisory Board, in which you will clearly synthesize and present your findings to the advising body.

Design Components

- Site evaluation
- Energy source selection
- Model draft

- Engineering
- Preliminary Evaluation
- Revision

- Final Evaluation
- Recommendation

Site Evaluation _____/5 , Due Date- February 19

Review and analyze the maps of energy sources in Utah. Identify a site in which the energy source will be harnessed and the destination for the energy source. The energy will be utilized for residential and industrial purposes, so the final destination needs to be in a relatively populated area.

Site of production:	Site of consumption:	
Rationale:		

Energy Source Selection _____/5, Due Date- February 19

Consider the pros and cons of each alternative energy source, as well as the locations of energy production and consumption. Identify the type of alternative energy generation you will model and explain your rationale for selecting this form of energy production.

Alternative energy source:

Rationale:

Model Draft _____/5, Due Date- February 19

Draw a sketch of the model you will design to generate electricity OR decrease energy consumption. Include labels and measurements for your model. Describe the model you are proposing and explain why this model is suitable for your engineering needs. Identify parameters you can assess to determine the effectiveness of the model. Share draft with Ms. Moretz before moving on to building your model.

Sketch:

Description:	Rationale:	
p		
Parameters to evaluate to determine model success:		

Engineering ____/10, Due Date February 22

Use your approved draft to construct your alternative energy model. You are welcome to use provided classroom materials as well as supplies brought from home. Cost of materials may not exceed \$5.00 per group. All construction should take place at SLCSE.

Preliminary Evaluation ____/10, Due Date February 22

Determine the success of your model by evaluating the parameters identified in the drafting stage of the lab. Record your findings in a data table. Additionally, show your model to Ms. Moretz or another lab group, noting their feedback for future revisions.

Data Table:

Feedback:

Revisions _____/5, Due Date February 25

Consider the both the feedback and preliminary data. Identify the strengths and weaknesses of your model and determine the modifications needed to improve the model's effectiveness. Use this information to revise your model.

Strengths:	Weaknesses:
Modifications:	

Final Evaluation _____/10, Due Date February 25

Determine the success of your revised model by evaluating the parameters identified in the drafting stage of the lab. Record your findings in a data table.

Data Table:

Recommendation to APES Energy Advisory Council: ____/20, Due Date February 25

The responsibility of the APES Energy Advisory Council is tasked with the responsibility of reviewing energy production proposals and determining their validity for large scale energy production. Consider your energy production model and the final results of its evaluation to write a clear and concise synopsis of the benefits your energy source may offer consumers. You will present your findings to the Advisory Council for approval.

Be sure to include the following:

- description of the model
- rationale for the benefits offered by this energy source as it relates to the site of both its energy production and consumption
- description of short-comings that should be addressed in future iterations
- data-backed explanation with supporting graphs of the source's energy production capabilities.

AP Environmental Science Energy Resources

Hydrology of Utah



Solar Energy Map of Utah



Map of Wind Speeds in Utah



Map of Geothermal Zones in Utah

