Real STEM Modified UbD Unit Design

Title of Unit	Energy	**Grade Level**	11-12
Curriculum Area	Environmental Science	**Time Frame**	6 weeks
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Identify Desired Results (Stage 1)

Goals (Content Standards)

SEV3. Obtain, evaluate, and communicate information to evaluate types, availability, allocation, and sustainability of energy resources.

a. Analyze and interpret data to communicate information on the origin and consumption of renewable forms of energy (wind, solar, geothermal, biofuel, and tidal) and non-renewable energy sources (fossil fuels and nuclear energy).
b. Construct an argument based on data about the risks and benefits of renewable and nonrenewable energy sources. (Clarification statement: This may include, but is not limited to, the environmental, social, and economic risks and benefits.)
c. Obtain, evaluate, and communicate data to predict the sustainability potential of renewable and non-renewable energy resources.
d. Design and defend a sustainable energy plan based on scientific principles for your location.

Understandings

Students will understand that…	Questions that provoke, address conceptual foundation
• Energy cannot be created nor destroyed but can be unattainable. • Energy sources are classified as renewable or nonrenewable based on accessibility. • Solar, Wind, Geothermal, Biomass and Hydro power are renewable energy resources. • Each type of energy resource has a set of benefits and limitations for its use. • Data will show sustainability potential for renewable energy resources • Sustainable energy plans will vary by geographic location due to environmental factors.	1. What is the difference between a renewable energy source and a nonrenewable energy source? 2. Where do renewable forms of energy originate? 3. What are the risks and benefits of each type of renewable energy? 4. Why are renewable energy sources considered sustainable? 5. Which renewable energy sources would be the best investment for our community?

Knowledge Students will know…	**Skills** Students will be able to…
1. Energy cannot be created nor destroyed but can be unattainable. 2. Energy sources are classified as renewable or nonrenewable based on accessibility. 3. Each type of energy resource has a set of benefits and limitations for its use. 4. Sustainable energy plans will vary by geographic location due to environmental factors	1. Differentiate between non-renewable and renewable energy sources. 2. Explain benefits and limitations for each type of energy source. 3. Produce an energy efficient house for the environmental conditions of the school and community.

Assessment Evidence (Stage 2)

Performance Task	**Other Evidence (quizzes, tests, observations…..)**
Students will construct a model house with a solar panel, wind turbine, a greenhouse and windows. Students will investigate heat transfer, solar and wind energy and collect data to provide solutions to real world home energy issues.	Students will take a pre-test and interest survey at the beginning of the unit. Halfway through the unit students will complete a quiz and construct a rough draft of their lab report. Students will retake the interest survey and pre/post test to measure growth and write a formal lab report based on their performance task.

STEM Criteria

Science	**Technology**
Environmental Science SEV3 Students will obtain evaluate and communicate information to evaluate types, availability, allocation, and sustainability of energy resources.	Student will construct and calculate energy production for a wind turbine Student will manipulate and calculate energy production for a wind turbine Students will collect data using a multimeter

Engineering	**Mathematics**
Students will design of model house Students will produce wind turbine blades to find maximum efficiency Student will discover optimal placement of solar panel to find maximum efficiency Design of insulation and draft reduction	Students will Calculate power based on experimental data Students will Graph experimental data and extrapolate Calculate efficiency based on known and experimental values

Complex System

Learning Plan (Stage 3)

Project Based

Students will work to write a Lowes grant to build a solar powered cell phone station(s) to provide both students and parents access to a charging station while on campus. Students will also design, construct and determine optimal placement for the cell station.

Problem Based

Place Based

Detailed Lesson Plan: provide enough detail that another experienced STEM teacher could implement your lesson. Feel free to use 5E or other lesson plan formats here, a format required by your school, or your own planning format.