

MYP/3D Science Unit Planner

Marietta City Schools

Grade & Course: Environmental Science	Topic: Energy Resources	Duration: 6 Weeks
Teachers: Diana Perez Mora , Hunter Fisher , Jeremy Armstrong, O'Neal McRunnels		
Georgia Standards and Content: SEV3. Obtain, evaluate, and communicate information to evaluate types, availability, allocation, and sustainability of energy resources. <ul style="list-style-type: none"> 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. 		
Narrative / Background Information		
Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT) Fossil fuels are natural fuel sources formed by historical geological processes from the remains of living organisms. The most used fossil fuels include coal, oil, and natural gas. These are nonrenewable , meaning these sources of energy are depleted by use and can be permanently eliminated. Alternate fuel sources include solar, wind, biomass, hydroelectric/tidal, and geothermal energy, which are renewable. These sources occur naturally by the sun, wind, and plant life.		
Year-Long Anchoring Phenomena: (LEARNING PROCESS) A renewable energy source such as biomass is sometimes regarded as a good alternative to providing heat and electricity with fossil fuels. Biofuels are not inherently ecologically friendly for this purpose, while burning biomass is carbon-neutral, air pollution is still produced.		
Unit Phenomena (LEARNING PROCESS) Nonrenewable energy sources include fossil fuels that come from beneath the ground and take thousands of years to form.		
MYP Inquiry Statement: Scientific innovation leads to global sustainability of energy consumption and natural resources in the environment.		
MYP Global Context: Fairness and Development		

Science and Engineering Practices: <ul style="list-style-type: none"> - Develop and Using Models - Constructing explanations and designing solutions - Collect and analyze data - Identify solutions and make informed decisions - Obtaining, evaluating, and communicating information ATL <ul style="list-style-type: none"> - Research Skills - Thinking Skills - Collaboration Skills - Communication Skills 	Disciplinary Core Ideas: (KNOWLEDGE & SKILLS) <ul style="list-style-type: none"> Energy Resources Renewable Resources Non-renewable Resources Energy consumption Alternative Resources Graph Reading 	Crosscutting Concepts: (KNOWLEDGE & SKILLS) <ul style="list-style-type: none"> • Matter and Energy • Structure and Function • Stability and Change MYP Key and Related Concepts: <ul style="list-style-type: none"> System and System Models Energy & Environment
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Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)

A major misconception is that students do not understand that the amount of energy used to produce renewable energy can sometimes be excessive, that non-renewable resources are not available everywhere, or the environmental impact of fossil fuels. Another misconception is that the cost of going entirely renewable is too expensive and harms the economy.

Vocabulary: (KNOWLEDGE & SKILLS)

Renewable Energy, Non-renewable energy, Energy efficiency, Nuclear Energy, Nuclear Fission, Nuclear Fusion, Fossil Fuels, strip mining, subsurface mining, natural gas, acid drainage, Energy conservation, biomass energy, geothermal energy, hydropower, solar energy, photovoltaic (PV) cell, Wind power, Wind turbine, Fuel Cell

Inquiry Questions:

Factual -

- How is energy generated and distributed?
- What is an energy resource?
- How are energy resources exploited?

Conceptual -

- Why do people produce energy? What is it for?
- What is the difference between a renewable resource and a non-renewable resource?
- How do we measure energy?

Debatable -

- What laws can local politicians implement to help conserve our non-renewable resources?

MYP Objectives	Summative assessment	
Sciences Design	Assessment Task: <ul style="list-style-type: none"> - Unit 3 Common Summative Assessment Criterion B & C 	Relationship between summative assessment task(s) and statement of inquiry: Summative assessments will allow students to demonstrate their understanding of energy resources and the advantages and disadvantages of their uses.
Unit Objectives:		

Learning Activities and Experiences	Inquiry & Obtain: (LEARNING PROCESS)	Evaluate: (LEARNING PROCESS)	Communicate: (LEARNING PROCESS)
Week 1:	Popcorn Lab: A bag of popped popcorn will represent an ecosystem and students must take into consideration the effect that overuse has on an ecosystem. This will model how the ecosystems are affected when nonrenewable resources are obtained.	Graphic Organizer Summarize the advantages and disadvantages of using nonrenewable energy resources. CER Writing Assignment and Discussion Students will investigate to determine the best type of energy to use in the United States and post responses in Schoology.	Nonrenewable Energy Graphic Organizer Reasoning CER – Do you think Nonrenewable energy is the best type of energy for us to use in the United States? What type of energy production do you believe is best for the United States and why?
Week 2:	Renewable vs Non-renewable Energy (Task-rotation): <ul style="list-style-type: none"> ● Mastery Task: Renewable vs. Nonrenewable Venn diagram ● Understanding Task: Renew-a-bean Lab ● Self-Expressive: Energy Superhero/Villain ● Interpersonal Task: “Mining the mountains” 	Students will rotate among the four tasks and teacher will be available for questions and ensure that students complete the following tasks: <ul style="list-style-type: none"> ● Mastery Task: Students will complete a Renewable vs. Nonrenewable Venn diagram ● Understanding Task: Students will complete a Renew-a-bean Lab lab ● Self-Expressive: Students will complete energy Superhero/Villain diagram on paper. ● Interpersonal Task: Students will answer guiding questions on two “Mining the mountains” articles. 	Communicate Reasoning: Students will complete following <ul style="list-style-type: none"> ● Mastery Task: Students will complete a Renewable vs. Nonrenewable Venn diagram and submit individually via schoology for grading. ● Understanding Task: Students will complete a Renew-a-bean Lab lab activity and submit individually via schoology for grading. ● Self-Expressive: Students will complete energy Superhero/Villain diagram and present to the class. ● Interpersonal Task: Students will answer guiding questions on two “Mining the mountains” articles and share in small groups
Week 3:	New American Lecture edpuzzle human energy consumption. CER make a claim about how nuclear energy is different from other nonrenewable energy resources.	Synthesis differentiated activity <ul style="list-style-type: none"> - graphic organizer - writing - thinking map CER writing assignment w/rubric Calculating Energy Consumption with Energy Bill and Water Bill	CER writing “Human Energy Consumption Calculation Activity” Students will reflect on their individual daily energy consumption and analyze sample energy bills to apply real-world ideas to content.

Week 4:	Climate Interactive Role-Play & Class Debate: Student groups take on the roles of interest groups, industry and government to argue and negotiate how to keep greenhouse gas emissions under 2 degrees C warming.	Peer evaluations Group Performance evaluation rubric	Students will communicate through a number of rounds of proposals in order to reach a compromise
Week 5:	Science Practice -- hypothesis, dependent and independent variables, control, reproducibility		MYP B and C Lab Report
Week 6:	Review & Assessment	Shared unit summative assessment	Free-Response Questions on Summative Assessment

Resources (hyperlink to model lessons and/or resources):

popcorn lab- https://jondyer.weebly.com/uploads/5/8/7/9/58794479/80.3_energy_renewable_or_not_lab.pdf

renew-a-bean- <https://marietta.schoolology.com/template/1966151769>

energy superhero/villain - <https://marietta.schoolology.com/template/2018702180>

nuclear energy -- textbook on Pearson chapter 17 p. 536

windmill project -- <https://marietta.schoolology.com/template/2018702180>

DataNugget -Growing Energy - Comparing Biofuel Crop Biomass

http://datanuggets.org/wp-content/uploads/2015/04/Growing-Energy_StudentA.pdf

Human Energy Consumption Materials

https://drive.google.com/open?id=1qBToHNuPYh1is5rizhwkCa_LLjBAvKS

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
Cause and Effect Global Problem Prioritization	Law of Conservation of Matter Open and Closed Systems Problem and Solution Current and Historical Environmental Legislation Legislative Process	<i>Going into climate change:</i> Cause and Effect Global Problem Prioritization Global Energy Needs per Capita Global Responsibility