

Marietta City Schools

<b>Grade &amp; Course:</b> Environmental Science		<b>Topic:</b> Unit 5: Energy Resources	<b>Duration:</b> 5 weeks
<b>Teachers:</b> Env. Science PLC Teachers			
<b>Georgia Standards and Content:</b>			
<p>SEV3. Obtain, evaluate, and communicate information to evaluate types, availability, allocation, and sustainability of energy resources.</p> <p>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).</p> <p>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.)</p> <p>c. Obtain, evaluate, and communicate data to predict the sustainability potential of renewable and non-renewable energy resources.</p> <p>d. Design and defend a sustainable energy plan based on scientific principles for your location.</p>			
<b>Narrative / Background Information</b>			
<b>Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)</b>			
<ul style="list-style-type: none"> <li>• Difference between potential and kinetic energy</li> <li>• Forms of energy (mechanical, thermal, chemical, electrical, nuclear)</li> <li>• Ecosystem interactions and impacts of energy production</li> <li>• Pollution and environmental degradation (e.g., greenhouse gases, habitat destruction)</li> <li>• Climate change and its relation to energy consumption</li> <li>• Societal needs for energy</li> <li>• Basic economic principles</li> </ul>			
<b>Year-Long Anchoring Phenomena: (LEARNING PROCESS)</b>			
Human activities have negatively impacted ecosystems, global climate, energy resources, and population.			
<b>Unit Phenomena (LEARNING PROCESS)</b>			
The city of Atlanta is facing an energy crisis driven by aging infrastructure, increased demand, and extreme weather events.			
<b>MYP Inquiry Statement:</b>			
The city of Atlanta is experiencing an energy crisis due to a combination of factors, including aging infrastructure, increased demand, and extreme weather events. The city council is considering various options to address this crisis, yet each option has potential risks and benefits, and the decision will have significant environmental, economic, and social implications for the city's residents.			
<b>MYP Global Context:</b>			
<ul style="list-style-type: none"> <li>• <i>Globalization and sustainability</i></li> </ul>			
<b>Approaches to Learning Skills: (SEPs)</b>	<b>Disciplinary Core Ideas: (KNOWLEDGE &amp; SKILLS)</b>	<b>Crosscutting Concepts: (KNOWLEDGE &amp; SKILLS)</b>	
<ul style="list-style-type: none"> <li>• Asking Questions and Defining Problems</li> <li>• Develop and use Models</li> <li>• Plan and carry out investigations</li> <li>• Analyzing and Interpreting Data</li> </ul>	<ul style="list-style-type: none"> <li>• Renewable and Nonrenewable Energy Sources</li> <li>• Risks and Benefits of Energy Sources</li> <li>• Sustainability Potential of Energy Resources</li> </ul>	<ul style="list-style-type: none"> <li>• Cause and Effect</li> </ul>	
		<b>MYP Key Concepts:</b>	
		<ul style="list-style-type: none"> <li>• <i>Systems</i></li> </ul>	
		<b>Related Concepts:</b>	
		<ul style="list-style-type: none"> <li>• <i>Interactions</i></li> </ul>	

<ul style="list-style-type: none"> <li>● Constructing Explanations and Designing Solutions</li> <li>● Engaging in Argument from Evidence</li> <li>● Obtain, Evaluate, and Communicate Information</li> </ul> <p><b>(ATL Skills)</b></p> <ul style="list-style-type: none"> <li>● Research Skills: Access information to be informed and inform others.</li> <li>● Collaboration Skills: Listen actively to other perspectives and ideas.</li> </ul>	<ul style="list-style-type: none"> <li>● Designing a Sustainable Energy Plan</li> </ul>	<ul style="list-style-type: none"> <li>● <i>Energy</i></li> </ul>
---	---	---

**Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)**

Renewable energy is always better than nonrenewable energy  
 Nonrenewable energy is completely unsustainable  
 Energy sources have no connection to social or economic impacts  
 All renewable energy sources work equally well in all locations  
 Switching to renewable energy is a simple and immediate process  
 Nuclear energy is the same as fossil fuels  
 Sustainability only refers to environmental concerns

**Key Vocabulary: (KNOWLEDGE & SKILLS)**

<ol style="list-style-type: none"> <li>1. Energy</li> <li>2. Renewable energy</li> <li>3. Nonrenewable energy</li> <li>4. Sustainability</li> <li>5. Energy consumption</li> <li>6. Energy efficiency</li> <li>7. Wind energy</li> <li>8. Solar energy</li> <li>9. Geothermal energy</li> <li>10. Biofuel</li> <li>11. Tidal energy</li> <li>12. Fossil fuels</li> </ol>	<ol style="list-style-type: none"> <li>13. Coal</li> <li>14. Oil (petroleum)</li> <li>15. Natural gas</li> <li>16. Nuclear energy</li> <li>17. Carbon footprint</li> <li>18. Greenhouse gases</li> <li>19. Climate change</li> <li>20. Pollution</li> <li>21. Environmental impact</li> <li>22. Economic impact</li> <li>23. Social impact</li> </ol>	<ol style="list-style-type: none"> <li>24. Data analysis</li> <li>25. Risk assessment</li> <li>26. Evidence-based argument</li> <li>27. Modeling</li> <li>28. Scientific principles</li> <li>29. Energy grid</li> <li>30. Infrastructure</li> <li>31. Energy storage</li> <li>32. Energy distribution</li> <li>33. Energy demand</li> <li>34. Energy security</li> </ol>
--	---	--

**Inquiry Questions:**

**Factual**

1. What are the primary differences between renewable and nonrenewable energy sources?
2. How is energy produced from wind, solar, and geothermal resources?
3. What are the major environmental impacts of fossil fuel consumption?
4. How much of the world's energy comes from renewable versus nonrenewable sources?
5. What technologies are used to store energy from renewable sources like solar and wind?

**Conceptual**

1. Why is sustainability an important factor when evaluating energy resources?
2. How do geographic and climatic conditions affect the viability of different energy sources?
3. What are the trade-offs between economic growth and environmental protection when choosing energy sources?
4. How does energy consumption impact global climate change?
5. In what ways do social, economic, and environmental factors influence energy policy decisions?

**Debatable**

1. Should governments prioritize renewable energy over nonrenewable energy, regardless of cost?
2. Is nuclear energy a sustainable and safe alternative to fossil fuels?
3. Are the environmental impacts of renewable energy sources (e.g., land use for wind farms) justified by their benefits?

4. Can developing countries transition to renewable energy without compromising economic growth?
5. Should individuals or governments bear the primary responsibility for reducing carbon footprints through energy choices?

MYP Objectives	Summative assessment	
<p>Criterion C.ii</p> <p>Criterion B.i.</p>	<p><u>MYP Assessment Task:</u></p> <p><b>Criterion C: Processing and evaluating</b></p> <ul style="list-style-type: none"> <li>● Strand <u>C.ii</u>: Interpret data and outline results using scientific reasoning.</li> </ul> <p><b>Criterion B: Inquiring and designing</b></p> <ul style="list-style-type: none"> <li>● Strand B.i: Outline an appropriate problem or research question to be tested by a scientific investigation.</li> </ul> <p><u>Unit 4 CSA Assessment</u></p> <p><u>Data Analysis CER</u></p> <p><u>Group/Individual Projects</u></p>	<p>Relationship between summative assessment task(s) and statement of inquiry:</p> <p>Summative assessments and Group presentations will allow students to demonstrate their understanding of unit material. Students will also reflect on the implications of science.</p>

Unit Objectives:			
Learning Activities and Experiences	Inquiry & Obtain: (LEARNING PROCESS)	Evaluate: (LEARNING PROCESS)	Communicate: (LEARNING PROCESS)
<p>Weeks 1 and 2:</p> <p>SEV3a/b</p>	<p>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.</p> <p>Renewable vs Non-renewable Energy (Task-rotation):</p> <ul style="list-style-type: none"> <li>● Mastery Task: Renewable vs. Nonrenewable Venn diagram</li> <li>● Understanding Task: Renew-a-bean Lab</li> <li>● Self-Expressive: Energy Superhero/Villain</li> <li>● Interpersonal Task: "Mining the mountains"</li> </ul>	<p>Graphic Organizer</p> <ul style="list-style-type: none"> <li>● Summarize the advantages and disadvantages of using nonrenewable energy resources. CER Writing Assignment and Discussion</li> <li>● Students will investigate to determine the best type of energy to use in the United States and post responses in Schoology.</li> </ul> <p>Students will rotate among the four tasks and teacher will be available for questions and ensure that students complete the following tasks:</p> <ul style="list-style-type: none"> <li>● Mastery Task: Students will complete a Renewable vs. Nonrenewable Venn diagram</li> <li>● Understanding Task: Students will complete a Renew-a-bean Lab lab</li> <li>● Self-Expressive: Students will complete energy Superhero/Villain diagram on paper.</li> <li>● Interpersonal Task: Students will answer guiding questions on two "Mining the mountains" articles.</li> </ul>	<p>Nonrenewable Energy Graphic Organizer</p> <p>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?</p> <p>Communicate Reasoning: Students will complete following</p> <ul style="list-style-type: none"> <li>● Mastery Task: Students will complete a Renewable vs. Nonrenewable Venn diagram and submit individually via schoology for grading.</li> <li>● Understanding Task: Students will complete a Renew-a-bean Lab lab activity and submit individually via schoology for grading.</li> <li>● Self-Expressive: Students will complete energy Superhero/Villain diagram and present to the class.</li> <li>● Interpersonal Task: Students will answer guiding questions on two "Mining the mountains" articles and share in small groups</li> </ul>

<b>Weeks 3 and 4:</b>  <b>SEV3c/d</b>	<p>New American Lecture edpuzzle human energy consumption.</p> <p>CER make a claim about how nuclear energy is different from other nonrenewable energy resources.</p> <p>Climate Interactive Role-Play &amp; Class</p> <p>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.</p>	<p>Synthesis differentiated activity</p> <ul style="list-style-type: none"> <li>- graphic organizer</li> <li>- writing</li> <li>- thinking map</li> </ul> <p>CER writing assignment w/rubric</p> <p>Calculating Energy Consumption with Energy Bill and Water Bill</p> <p>Peer evaluations Group Performance evaluation rubric</p>	<p>CER writing "Human Energy Consumption Calculation Activity"</p> <p>Students will reflect on their individual daily energy consumption and analyze sample energy bills to apply real-world ideas to content.</p> <p>Students will communicate through a number of rounds of proposals in order to reach a compromise</p>
<b>Week 5:</b> <b>Review and CSA</b>	Review Unit Material with Students	Unit Study Guide Unit CSA	Assessment Results & Recovery Opportunities

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

Discovery Education Science Techbook

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

Prior to teaching the unit	During teaching	After teaching the unit

**Curriculum Unit Approval Statement**

*Every team member is expected to read and review the unit planner and contents contained in the unit planner.*

This unit meets the rigorous review and approval process of Marietta City Schools. All components of the unit have been reviewed and approved including learning experiences, materials, resources, texts, and assessments. This unit's components:

- Are aligned to Georgia Standards of Excellence and MYP/DP subject area guide (if applicable)
- Are aligned to the pacing of the approved Subject Group Overview
- Provide resources that are appropriate for students' grade level, subject/course level, etc.
- Provide learning experiences that prepare students for course assessments

PLCs review each learning experience using three criteria and collaborate to provide explicit and specific information.

<p><b>Criteria I: Standards Alignment:</b></p> <p><i>Learning experiences should provide alignment to the standards and the MYP subject area guide (if applicable).</i></p>	<p><b>Criteria II: Materials, Resources, and Text Complexity and Controversial Topics and Issues:</b></p> <p><i>Materials, resources, and texts are grade level and content appropriate.</i></p>	<p><b>Criteria III: Assessment Alignment:</b></p> <p><i>Since assessment drives instruction, learning experiences must align to and prepare students for regular common formative and summative assessments used to determine whether students are mastering standards-based content and ATL skills.</i></p>
---	--	--

**Common Formative and Summative Assessments**

<p><b>Assessment Title</b></p>	<p><b>Criteria I:</b> Does the PLC have any <u>concerns</u> or <u>issues</u> regarding the <u>alignment of learning experiences, materials, and resources</u> to:</p> <ol style="list-style-type: none"> <li>1. <b>State Standards</b></li> <li>2. <b>MYP/DP (if applicable) components</b></li> <li>3. <b>Aligned to learning experiences</b></li> </ol> <p>Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution.</p>	<p><b>Criteria II:</b> Does the PLC have any <u>concerns</u> or <u>issues</u> regarding</p> <ol style="list-style-type: none"> <li>1. <b>Complexity of resources including text and vocabulary</b></li> <li>2. <b>Controversial topics and issues in learning experiences, materials or resources</b></li> </ol> <p>Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution. Include the <b>specific quote(s)</b> and reference <b>page numbers</b> or <b>location</b> (ex: time in video).</p>
<p><b>Formative Assessment(s) :</b></p>	<p>N/A</p>	<p>N/A</p>
<p><b>Summative(s) Assessment:</b></p>	<p>N/A</p>	<p>N/A</p>
<p>Plan to address issues or concerns noted:</p>		

**Learning Experiences**  
Add additional rows below as needed.

<b>Learning Experience Title</b>	<b>Criteria I:</b> Does the PLC have any <u>concerns</u> or <u>issues</u> regarding the <u>alignment of learning experiences, materials, and resources to:</u> 1. <b>State Standards</b> 2. <b>MYP/DP (if applicable) components</b>  Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution.	<b>Criteria II:</b> Does the PLC have any <u>concerns</u> or <u>issues</u> regarding 1. <b>Complexity of resources including text and vocabulary</b> 2. <b>Controversial topics and issues in learning experiences, materials or resources</b>  Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution. Include the <b>specific quote(s)</b> and reference <b>page numbers</b> or <b>location</b> (ex: time in video).	<b>Criteria III:</b> Does the PLC have any <u>concerns</u> or <u>issues</u> regarding 1. <b>Common Assessment alignment to instruction and/or standards</b>  Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution.
LE 1:	N/A	N/A	N/A
LE 2:	N/A	N/A	N/A
LE 3:	N/A	N/A	N/A
Plan to address issues or concerns noted:			

**Resources listed on unit planner**  
Add additional rows below as needed.

<b>Resources</b>	<b>Criteria I:</b> Does the PLC have any <u>concerns</u> or <u>issues</u> regarding the <u>alignment of learning experiences, materials, and resources to:</u> 1. <b>State Standards</b> 2. <b>MYP/DP (if applicable) components</b>  Respond below with a N/A if you have no concerns or provide explicit comments related to	<b>Criteria II:</b> Does the PLC have any <u>concerns</u> or <u>issues</u> regarding 1. <b>Complexity of resources including text and vocabulary</b> 2. <b>Controversial topics and issues in learning experiences, materials or resources</b>  Respond below with a N/A if you have no concerns or provide explicit	<b>Criteria III:</b> Does the PLC have any <u>concerns</u> or <u>issues</u> regarding 1. <b>Common Assessment alignment to instruction and/or standards</b>  Respond below with a N/A if you have no concerns or provide explicit comments related to concerns including method of resolution.

	concerns including method of resolution.	comments related to concerns including method of resolution. Include the <b>specific quote(s)</b> and reference <b>page numbers</b> or <b>location</b> (ex: time in video).	
<b>Resource:</b>	N/A	N/A	N/A
Plan to address issues or concerns noted:			

***By typing my name below I am acknowledging that I have fully read, reviewed, listed concerns with resolutions, and approved of all contents included in the unit planner including learning experiences, materials, resources, texts, and assessments referenced on it. All other content and materials not included on the unit planner are the local school's responsibility (BOE IKB).***  
Curriculum Team Signatures: