Lesson Plan Title: Energy Research, Design, & Construction

<table>
<thead>
<tr>
<th>Teacher Name: Vince Lorenz</th>
<th>School: Kokomo High School</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subject:</strong> Earth Space Science, Astronomy, Meteorology, &amp; Physical Geology</td>
<td><strong>Grade Level:</strong> 10-12</td>
</tr>
</tbody>
</table>

### Problem statement, Standards, Data and Technology

<table>
<thead>
<tr>
<th>Asking questions and defining problems</th>
<th>Which type(s) of energy is best suited for our future? Expecting of energy is most efficient? Which type(s) of energy is most effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish driving question for the lesson plan or define problem students will be solving.</td>
<td>Attach any documents used to establish the driving question or define the problem.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Incorporating Next Generation Science Standards, Common Core, or State Standards</th>
<th>E.S. 3.4 Evaluate the use of sustainable versus nonrenewable resources. Explain the consequences of overuse and continued increased consumption of limited resources. Analyze and evaluate the benefits of researching, designing, and developing sustainable resources for private use and industry.</th>
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</thead>
<tbody>
<tr>
<td>State the standards that will be covered during this lesson plan. Include all standards which may apply (NGSS, Common Core, or State Standards).</td>
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<table>
<thead>
<tr>
<th>Obtaining and evaluating information</th>
<th>Research all 10 major types of energy, both nonrenewable and renewable. (coal, oil, natural gas, solar, wind, nuclear, bioenergy, hydroelectric, and ocean energy) Students will then evaluate that information make decisions on 6 best types of energy to include within their models for their chosen city.</th>
</tr>
</thead>
<tbody>
<tr>
<td>How will students be obtaining and/or collecting the information?</td>
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<tr>
<td>Analyzing and interpreting data</td>
<td>Research of different types of energy. Which type(s) of energy seem to be most efficient? Which type(s) is least efficient? Analyze and reflect on energy as a group.</td>
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<tr>
<td>--------------------------------</td>
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<tr>
<td>Use of technology and software</td>
<td>Laptops, Internet, variety of materials provided in class to construct models. (Outside resources/ other career center courses; example: welding)</td>
</tr>
</tbody>
</table>

**Collaboration, critical thinking and communication**

<table>
<thead>
<tr>
<th>Collaboration</th>
<th>Groups of 3-4, Defined roles are chosen within the group: Leader, Recorder, Contractor, Assistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Thinking</td>
<td>Students will research how energy is obtained, transmitted, and distributed; the advantages and disadvantages of each type of energy. They will also research different locations that utilize each specific type of energy and the efficiency in those locations to make decisions for their chosen city.</td>
</tr>
<tr>
<td>Communication</td>
<td>PowerPoint Research &amp; Model Presentation</td>
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<td>---------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>How will the students communicate their findings and conclusion regarding the established question and/or problem?</td>
<td></td>
</tr>
</tbody>
</table>

## References

<table>
<thead>
<tr>
<th>Teacher’s References</th>
<th><a href="http://serc.carleton.edu/introgeo/cooperative/roles.html">http://serc.carleton.edu/introgeo/cooperative/roles.html</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Include all references used to develop and implement this lesson plan.</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Student’s References</th>
<th>Students must complete research of the resources needed to complete the project.</th>
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<tbody>
<tr>
<td>Include all references students will need to complete this lesson plan.</td>
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</table>

## Assessment Plan

<table>
<thead>
<tr>
<th>Assessment Plan</th>
<th>Students will be assessed using a final research project and constructed model that will be presented discussing which type(s) of energy would be most efficient for our future.</th>
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<tbody>
<tr>
<td>How will the students be assessed during and/or at the end of the lesson plan?</td>
<td></td>
</tr>
<tr>
<td>Include resources that will be used to assess the students for the lesson plan.</td>
<td></td>
</tr>
</tbody>
</table>
# Resources and Costs

<table>
<thead>
<tr>
<th>Resources Needed</th>
<th>Recycled Materials</th>
<th>Cardboard, construction paper, empty water bottles, bottle caps, paper clips</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Miscellaneous</td>
<td>Various colors of pipe cleaner, craft fabric, play dough, toothpicks, popsicle sticks, aluminum foil, styrofoam, colored markers, sharpie marker, tape, glue, scissors, etc.</td>
</tr>
<tr>
<td></td>
<td>Extra/ “Optional” Materials</td>
<td>glue gun, Legos, toys, materials from outside of class (with teacher’s approval)</td>
</tr>
</tbody>
</table>

## Costs

List the estimated cost of implementing this lesson plan.

Include all costs related to equipment, materials and any resource critical to the implementation of the lesson plan.

The great thing about this lesson is you can complete it with about any budget. You can spend $5.00 per group to $20 or more per group. It depends on how many groups you have per section and how many sections you teach.

# Implementation Plan

## Implementation Plan Timeline

Establish the timeline to implement the lesson plan.

Provide an estimate of time and days in order to complete the lesson plan.

**Project duration**-7 days (from start to finish)

-5 days for research, design, and construction (2 day weekend)

-2 days for presentations
Energy Research, Design, & Construction Project

Earth Science- 3.4 Evaluate the use of sustainable versus nonrenewable resources. Explain the consequences of overuse and continued increased consumption of limited resources. Analyze and evaluate the benefits of researching, designing, and developing sustainable resources for private use and industry.

Asking Questions and Defining Problems: Which type(s) of energy is best suited for our future? Which type(s) of energy is most efficient? Which type of energy is most effective?

Directions: Work collaboratively as a group with defined group roles to research the best type(s) of energy for our future. Please apply concepts of both nonrenewable and renewable energy sources to create a model in which you will present. You need to decide who will take on each defined role within your group. You must create a google slides report of the types of energies. This project is worth 150 points. (60 points Model/Drawing, 30 points Presentation, & 60 points Research & Report).

Project duration-7 days (from start to finish)

(5 days for research, design, and construction; 2 days for presentations.)

Research & Report: You need to research all 10 types of energy listed below. Please include how the energy is obtained, transmitted, and distributed. When you have created your slides share your project with me. Please follow the instructions listed below so you do not miss any points.

Model & Presentation: Design and create a constructed model of a chosen location containing different types of energy sources. Please create a city name for your location. You must include the 6 of 10 energy types most efficient for your city. You will present how each type of energy functions within your city to meet your cities energy needs. You have a wide variety of materials provided to build your model. Please take only what you can use! You may also bring in resources from home to construct your model. Helpful hint: (I have had students who are in career center courses use those skills within this project; example: welding.)

Group Roles

Leader - Keeps group on task, oversees all jobs, takes the lead role for research, design, and construction. Takes lead role within the presentation of groups finished product.

Recorder- Consolidates all research information provided by each group member to prepare presentation. Collaborates information closely with each member for model and final presentation.

Contractor- Works closely with all other members to design and construct a model using supplies provided. Contractor has to work closely with Recorder to understand how each type of energy functions. Leader must oversee contractors work.

Assistant - Assists and collaborates with each member and provides help wherever needed. Assistant will write a brief summary of results for the Leader to review for presentation.
Slide #1 will include the following: (5 pts.)

a. Title the slide: **Energy Resources Project**

b. Name of group members

c. Your Period

d. A picture to represent Energy

Slide #2 will include the following: (5 pts.)

a. Title the slide: **Coal**

b. How is the energy obtained, transmitted, and distributed?

c. Advantages & Disadvantages

d. City/Location that currently utilizes it and the impact it has on that particular region.

Slide #3 will include the following: (5 pts.)

a. Title the slide: **Natural Gas**

b. How is the energy obtained, transmitted, and distributed?

c. Advantages & Disadvantages

d. City/Location that currently utilizes it and the impact it has on that particular region.

Slide #4 will include the following: (5 pts.)

a. Title the slide: **Oil**

b. How is the energy obtained, transmitted, and distributed?

c. Advantages & Disadvantages

d. City/Location that currently utilizes it and the impact it has on that particular region.

Slide #5 will include the following: (5 pts.)

a. Title the slide: **Solar Energy**

b. How is the energy obtained, transmitted, and distributed?

c. Advantages & Disadvantages

d. City/Location that currently utilizes it and the impact it has on that particular region.
Slide #6 will include the following: (5 pts.)

a. Title the slide: **Nuclear Energy**
b. How is the energy obtained, transmitted, and distributed?
c. Advantages & Disadvantages
d. City/Location that currently utilizes it and the impact it has on that particular region.

Slide #7 will include the following: (5 pts.)

a. Title the slide: **Wind Energy**
b. How is the energy obtained, transmitted, and distributed?
c. Advantages & Disadvantages
d. City/Location that currently utilizes it and the impact it has on that particular region.

Slide #8 will include the following: (5 pts.)

a. Title the slide: **Hydroelectric Power**
b. How is the energy obtained, transmitted, and distributed?
c. Advantages & Disadvantages
d. City/Location that currently utilizes it and the impact it has on that particular region.

Slide #9 will include the following: (5 pts.)

a. Title the slide: **Geothermal Energy**
b. How is the energy obtained, transmitted, and distributed?
c. Advantages & Disadvantages
d. City/Location that currently utilizes it and the impact it has on that particular region.

Slide #10 will include the following: (5 pts.)

a. Title the slide: **Bioenergy**
b. How is the energy obtained, transmitted, and distributed?
c. Advantages & Disadvantages
d. City/Location that currently utilizes it and the impact it has on that particular region.
Slide #11 will include the following: (5 pts.)

a. Title the slide: **Ocean Energy**

b. How is the energy obtained, transmitted, and distributed?

c. Advantages & Disadvantages

d. City/Location that currently utilizes it and the impact it has on that particular region.

Slide #12 will include the following: (5 pts.)

a. Title the slide: **Reflection: Our Viewpoint on Energy...**

b. Which type(s) of energy would your group most likely rely on for electricity? (You must come to an agreement.) Use evidence from your research to explain why you support it.

c. Which type(s) of energy would your group least likely rely on for electricity? (You must come to an agreement.) Use evidence from your research to explain why you support it.

d. Add a few pictures that represent which types of energies you would most likely rely on.